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# ON DROPSY,

AND ITS CONNECTION WITH

DISEASES OF THE KIDNEYS, HEART, LUNGS, AND LIVER, &c., &c.

# ON DROPSY,

AND ITS CONNECTION WITH

# DISEASES OF THE KIDNEYS, HEART, LUNGS, AND LIVER,

AS WELL AS ON

# SOME OTHER DISEASES OF THOSE ORGANS WITHOUT DROPSY.

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ILLUSTRATED BY

NUMEROUS DRAWINGS FROM THE MICROSCOPE.

BY

W. R. BASHAM, M.D.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, LATE CROONIAN LECTURER AT THE COLLEGE:
PHYSICIAN TO THE WESTMINSTER HOSPITAL, AND LECTURER ON THE PRINCIPLES
AND PRACTICE OF MEDICINE.

THIRD EDITION.

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TO

RICHARD BRIGHT, M.D., F.R.S.,

ETC., ETC.

Dear Sir,

The pathology of the disease which you were the first to describe, and which is inseparably associated with your name, has engaged the attention of many inquirers. The disease has been examined from various points of view, and much has been done to elucidate its causes, its complications, and its progress. The subject, however, is not exhausted; and in the following pages I have endeavoured to remove some of the obscurity which still surrounds several points connected with this disease.

It is with sincere and grateful respect that I dedicate these pages to you, animated with the hope that they may assist to place on a true basis the pathology of the disease which bears your name, and contribute to our knowledge of the foretokens of these diseases of the kidney.

I am,
Dear Sir,
Very faithfully yours,
W. R. BASHAM.

17, Chester Street, Grosvenor Place;
*August* 21*st*, 1858.

# PREFACE

TO THE

# THIRD EDITION.

THE author, encouraged by the demand for the last edition of this work, which is now out of print, as well as by the favour with which the "Croonian Lectures," delivered before the President and Fellows of the Royal College of Physicians, in 1864, have been received, has been induced to revise and re-arrange the original work, and to incorporate with it the chief part of the text of those lectures. The present edition therefore comprises the subject of dropsy as a symptom, not only of those forms of renal disease usually embraced by the term Bright's disease, but also those morbid states of the lungs, heart, and liver, of which dropsy, general or local, is significant. It is hoped that the re-arrangement of the chapters in the first part may serve to elucidate the pathology of Bright's disease more clearly, and more firmly establish the principles of treatment found most efficient in that formidable disease.

The subjects of gouty kidney, and of calculus or stone in the kidney, have been further illustrated by fresh cases, principally with the object of exhibiting the remedial agency of the citrate of potash and lithia on uric acid and its compounds. The use of these salts is eminently entitled to confidence, both in gout, gravel, and stone in the kidney. In notices of former editions of this work it has been objected by more than one friendly critic that the illustrations of the tube-casts and cells are too clearly defined. There is some truth in this objection and it has arisen from three causes. First, the engraver in some of the examples did not catch the particular expression of appearance intended to be represented; secondly, out of many hundred drawings only those figures were selected which were thought especially characteristic; and, thirdly, the method of manipulation to obtain what was conceived to be typical examples of the several forms of casts may not be that ordinarily employed. Thus, when a sample of urine has been found to contain characteristic casts and cells, a small quantity of the sediment was set aside in a small sized conical glass, made for the purpose, which was acidulated with a few drops of dilute acetic acid; a drop of this acidulated sediment gives a much clearer definition than when taken directly from the urine without any preparation. Moreover, the microscopic observations have been invariably made by day-light in a room with a north aspect, and by reflection from a white cloud if possible. When the reflector of the microscope is illuminated by artificial light, or by the strong rays of a southern aspect, the character of the outline is materially affected.

The plates have been placed together at the commencement instead of being distributed through the work. Opposite to each is a page explanatory of the figures. An index has been added, with the hope that as the work has been enlarged it may afford a ready reference to the several matters treated in the text.

17, Chester Street, Belgrave Square;
*April*, 1866.

# PREFACE

TO THE

# SECOND EDITION.

---

THE favorable reception which has been awarded to this work by the profession has invited the author to prepare a second edition for the press. A large amount of fresh matter has been added confirmatory of the object which the author originally had in view—to show that a careful examination and record of the microscopic appearances of the sediment in albuminous urine may at all times be accepted as a truthful interpretation of the advance or recession of the renal disorder, and therefore is essentially the safest guide to treatment. Upon one point the author has seen reason to modify the opinion formally expressed, that a state of inflammatory engorgement is universally the primary or antecedent stage of every form of morbus Brightii. There are clearly exceptions to this statement, although it is believed that the absence of this symptom will be found chiefly in that form of the disease which produces the so-called waxy kidney, and is associated more particularly with phthisis, cancer, and other exhausting diseases.

Upon the subject of treatment, and of the curative influence of certain remedies, the author can speak with greater confidence than formally. Experience justifies the assertion that with proper management at certain stages the most unfavorable cases need not be regarded as incurable.

The subject of renal abscess from calculus of the kidney has been amplified by the addition of several interesting and instructive cases; and tubercle of the kidney and its diagnosis has been further illustrated by cases, and plates exhibiting the characteristic post-mortem appearances. A chapter has been added on hæmaturia as a diagnostic symptom of malignant disease of the kidney or bladder.

The author has studiously avoided all controversial points; and he trusts that the inferences he has drawn from a carefnl clinical study of the cases coming under his observation, may be found useful in the diagnosis of obscure or doubtful forms of renal disease.

17, Chester Street, Belgrave Square;
*January*, 1862.

# PREFACE

TO THE

# FIRST EDITION.

---

The epithelial cell displays characters not less significant in disease than in health. Physiologically, either as protective to the various tubes or ducts which it lines, or, in the form of gland-cells, performing, in the inner recesses of some organs, as the kidneys, a mysterious and hitherto unexplained part in the office of excretion, it is constantly being renewed by a power inherent in the organism; and so long as the renewal is uninterrupted and complete, that process goes on undisturbed, and the equilibrium of health is preserved. Pathologically, whenever, from local or general causes, the regularity of the circulation is disturbed, and conditions of hyperæmia or blood stasis follow, the epithelial structures are the first to feel the disturbing influence, and the cells are thrown off with a rapidity incompatible with complete or efficient renewal, and are produced in an abortive or atrophic form; or when the higher degrees of inflammatory congestion prevail, these atrophic epithelial cells give place to others specially characteristic of the more intense forms of diseased action.

The epithelial cell consists of a cell-wall, within which is contained a fluid called mucosin—glairy, viscous, and transparent. A fine granular material is sometimes dispersed through this fluid. In the centre of the cell is a single nucleus, clear and well defined; with a high magnifying power, within this is seen another smaller body, the nucleolus, In studying the metamorphosis of these cells in disease, the essential points for attention are the defined appearance of the cell-wall, the absence or otherwise of granular matter within the cell, and the number of the nuclear bodies. Atrophic cells generally exhibit many nuclear granules, and as these nuclei are highly refractive and formed of fat-grains, the term fatty degeneration has been applied to abortive cells presenting these appearances.

Mucous membranes exhibit remarkable peculiarities in reference to these modifications or alterations of the epithelial cells, when thrown off under the influence of various morbid or disturbing causes; but our knowledge of these modifications of development has not hitherto been applied, beyond certain limits, to the elucidation of the nature or progress of disease. In affections of the air-passages, a pituitary, a mucous, a purulent, or a blood-stained excretion are, severally, evidence of disease, differing in intensity and kind. If the excretion from the mucous membrane in simple catarrh, in bronchitis, or in pneumonia, be microscopically examined, various modifications of cell-structure will be apparent, which are distinctly characteristic of these diseases. In catarrh the healthy epithelial cell is shed in abundance, but accompanied by other cells which appear to be atrophic, or abortive cells of the same class. They are usually more granular than the standard epithelial cell, and in place of a single nucleus several distinct nuclei appear collected together within the cell-wall. (See Plate V, figs. 5 and 6.) These have been variously named by different observers. It is the cytoid corpuscle of Henle, and bears a close resemblance to the lymph or colourless blood-corpuscle, except that it is much larger when occurring in catarrhal excretion. Associated with these in the severer forms of catarrh, in those approaching to the limits of inflammatory action, may be seen the compound inflammation-corpuscle of Gluge. This is a large ovoid or spherical cell, containing numerous resplendent nuclear granules. When the cell-wall is ruptured or dissolved, these nuclear granules remain clustered together in a grape-like mass; hence they are called botryoidal, or, by some writers, mulberry bodies. The mucus or fluid accompanying catarrhal exudation also exhibits many isolated resplendent granules, which are considered as free nuclei. These microscopic objects occur in the clear, viscid fluid—called mucus or mucosin—which appears for the most part to be derived from the rupture or breaking up of the cells whose nuclei are distributed through it. In bronchitis the excretion from the mucous surface is the product of a more energetic disturbing cause. The epithelial cell has altogether disappeared. The field of the microscope presents numerous cells, spherical in shape—uniform in appearance and size—smaller in diameter than the epithelial cell—somewhat granular on the surface of the cell-wall—and displaying within a trefoiled or reniform nucleus; these are the exudation- or pus-corpuscle. The fluid which accompanies them is less viscid and tenacious than the catarrhal fluid, and has moreover a faint alkaline reaction. The more purulent the secretion the less viscous is the accompanying fluid, and, practically, it is well known that in severe bronchitis, as the attack subsides, the sputa become more viscid, and ultimately return to conditions not unlike those observed in simple catarrh. In the early stage of pneumonia, the excreta consist of epithelium in small quantity, mixed with exudation- and compound inflammation-corpuscles in hourly increasing proportions, the whole mixed with a fine granular material, stained more or less with hæmatin, and with which not unfrequently a few isolated blood-corpuscles are mixed: this is the true croupous exudation. As the disease advances these characters are lost, and these cells give place to an abundant formation of pus-corpuscles: and the sputum then acquires many of the qualities characteristic of bronchitis. From these data we are justified in concluding that the respiratory mucous surface, under the influence of disease, gives off products differing according to the nature, intensity or duration of the disturbing cause. We have less need for the aid which these facts offer, and are less dependent on microscopic examination in diseases of the respiratory organs and passages, because the successful manner in which the stethoscope has been applied to the investigation of the morbid phenomena of this region, leaves a minute acquaintance with the microscopic character of the excreta unnecessary. But from other mucous surfaces similar products are cast off according to the nature and intensity of the disease. The present work is an effort to apply these facts to the investigation of diseases of the kidney; and to ascertain if the products thrown off from the tubuli uriniferi during the progress of disease possess any similar specific characters, from which correct deductions might be drawn as to the nature, degree, duration, or stage of the renal disorder.

The figures in the following illustrations have not been drawn to scale; they have been copied from the object glass with as much accuracy as possible. It may be thought that some of the illustrations have such general similarity, that a repetition of them was unnecessary; but the object of the author has been to present a faithful representation of the cells and casts at different periods of the disorder, irrespective of any change of character which might have taken place in them. The cases have been selected as typical cases of their class. The microscope employed has been either one of Powell's, or one made by Pillischer, with a quarter inch focal power. The author has with design limited himself to the use of very simple instruments and this focal power, because such instruments are within the reach of every practitioner, and may be used by those who are little skilled in microscopic observation. In the employment of the microscope for clinical purposes, the use of the most simple and least complicated instruments should be encouraged; for with these, observations may be made quickly, and without loss of time, and every practitioner, with moderate attention, may verify for himself with some degree of certainty the advance or decline of the renal disorder which his patient suffers.

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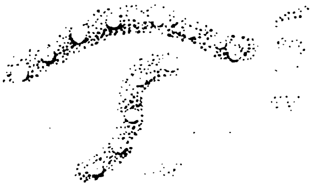
Fig. 1.



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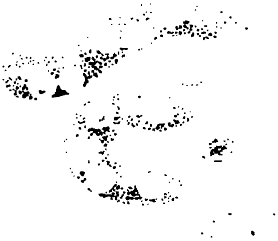

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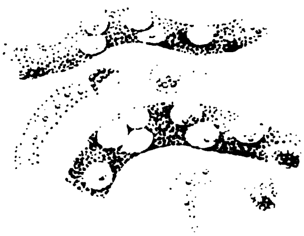

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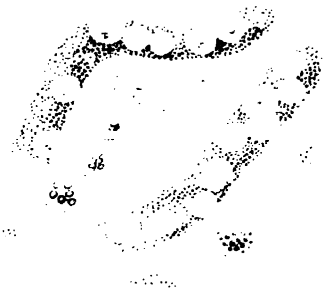

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# DESCRIPTION OF THE PLATES.

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## PLATE I.

### CASE 1.—Hæmaturia and Dropsy after Scarlet Fever, p. 75.

FIG.

1.—Blood-casts; amorphous fibrine stained with hæmatin; blood-corpuscles.

2.—Granular casts containing epithelial cells, healthy; two compound granule-cells; scales of epithelium from pelvis; one cast very transparent.

### CASE II.—Hæmaturia and Dropsy after Scarlet Fever followed by Uræmia, p. 80.

3.—Blood-casts; spherical epithelial cells.

4.—Granular casts containing epithelial cells; many compound granule-cells; granular casts containing only free nuclei; several grape-like clusters of nuclei; abortive or disintegrated cells.

5.—The same; the casts containing many clustered collections of resplendent granules of aggregated nuclei, as well as compound granule-cells; one granular cast containing free nuclei.

6.—Malpighian bodies and convoluted tubes from the cortical part of the kidney. Both appear to be stuffed with a fine granular exudation. The basement membrane is everywhere denuded of epithelium, and the torn extremities of the tubes exhibit the granular matter and abortive cells freely escaping.

### CASE III.—Hæmaturia after Scarlet Fever and Dropsy, p. 87.

7.—Fibrinous blood-casts; fibrinous flakes stained with hæmatin; scattered blood-discs and epithelial cells, healthy.

8.—Granular casts containing normal epithelium and a few blood-discs; fibrinous flakes stained with hæmatin.

9.—Second attack of hæmaturia.—Fibrinous blood-casts; fibrinous flakes stained with hæmatin; epithelial cells; one compound granule-cell.

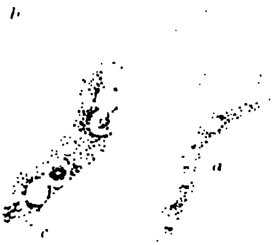
### CASE IV.—Scarlatinal Dropsy; recovery; p. 90.

10.—Fibrinous casts; two large compound granule-cells.

11.—Granular casts containing epithelial cells and blood-discs; one or two compound cells.

12.—Hyaline casts; a few scattered epithelial cells; resplendent granules; in all probability free nuclei; two compound granule-cells.

Fig. 1



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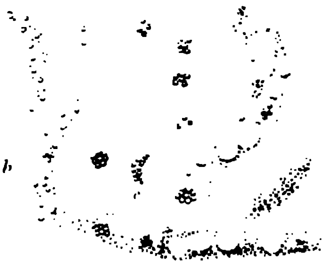

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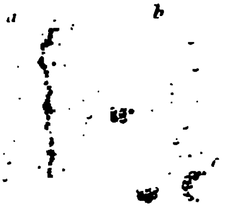

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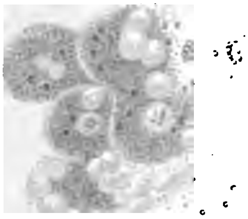

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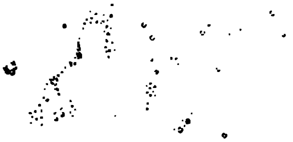

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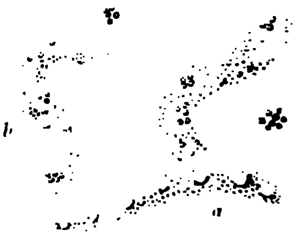

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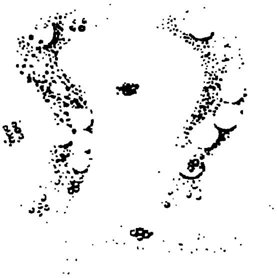

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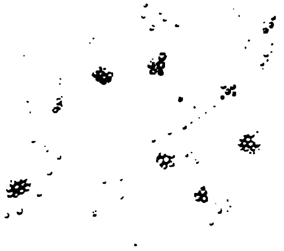

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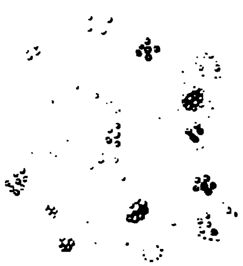

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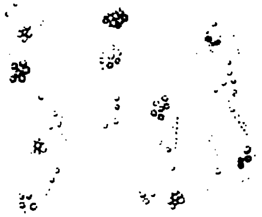

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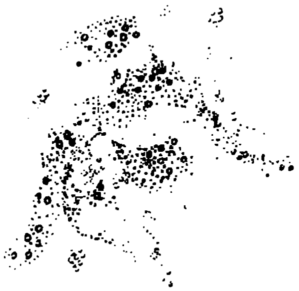

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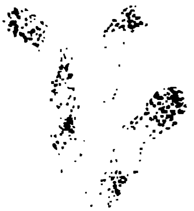


A. B. Macallum ad nat. del.

T. Grantham

# PLATE II.

## CASE V.—Scarlatinal Dropsy, p. 94.

FIG.

1, *a.*—Fibrinous cast containing blood-discs, and stained with hæmatin.
  *b.*—A cast containing only epithelial cells.
  *c.*—A granular cast, containing epithelial cells, blood-corpuscles, and compound granule-cells.

2.—Granular casts containing renal epithelium, and compound cells.
  *b.*—Granular casts containing free nuclei, presenting the appearance of highly resplendent molecules. Compound cells (glomeruli).
  *c.*—Here and there aggregations of fat-molecules deprived of their cell-wall, as of a broken-up glomerulus.

3.—Microscopic appearance of the fluid pressed out from one of the cones.
  *a.*—An epithelial cast.
  *b.*—Some epithelium from the straight tubes.
  *c.*—Some compound cells; broken up glomerulus; many free nuclei and granular matter diffused through the field.

4.—From the cortical part of the kidney. It represents a Malpighian body and tubes filled with a dark granular deposit or exudation. A convoluted tube partially deprived of its epithelium; its interior filled with a dark granular exudation—compound cells, free nuclei, and disintegrated cells.

5.—Tubes teazed out from the base of one of the cones. One part of the canal seems choked with granular exudation and detached epithelial cells. The basement membrane at one part seems entirely deprived of epithelial lining.

## CASE VII.—Acute Bright's Disease, p. 115.

6, *a.*—Fibrinous blood-cast.
  *b.*—Granular casts containing blood-discs and epithelial cells already becoming abortive. Many free nuclei.

7.—Granular casts containing epithelial cells, compound granule-cells, clusters of nuclei, and scattered blood-discs.

8.—The casts becoming less granular, the epithelial cells more abortive and fatty, many free nuclei, and grape-like clusters, as if deprived of the cell-wall.

9.—Casts becoming more hyaline, the epithelial cells more abortive; many compound granule-cells and free and clustered nuclei.

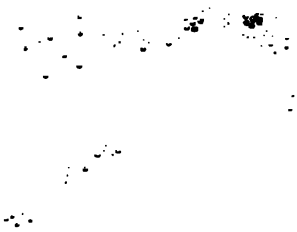
10.—The casts quite or nearly transparent, studded with compound granule-cells, free and clustered nuclei, evidence of the extent of the disintegration of cell-structure.

11.—A portion of the cortical part of the kidney, teazed out with needles. The Malpighian bodies and convoluted tubes, appear filled with a granular exudation, with which is mixed abortive cells, free nuclei, compound granule-cells, and clusters of fat-granules. The epithelial cells seem to have been broken up or destroyed, and the tube filled with their débris. Here and there normal epithelium is still adherent to the basement membrane.

12.—Granular casts from a case of cardiac and pulmonary dropsy; early stage of albuminous urine, caused by simple blood stasis.

PLATE

Fig. 1



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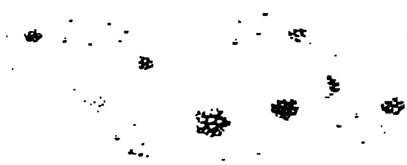

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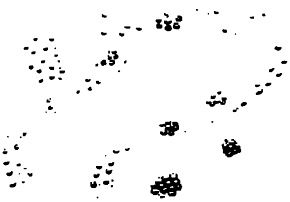

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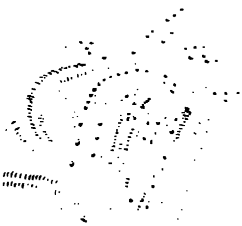

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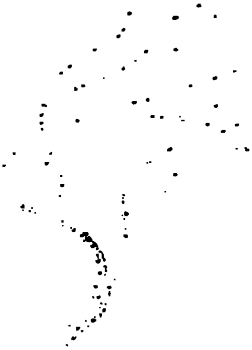

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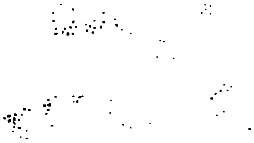

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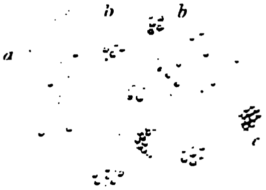

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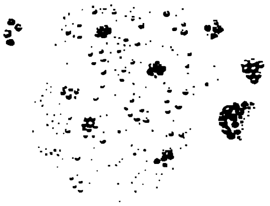

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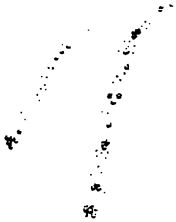

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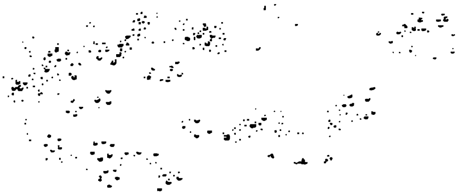

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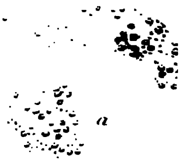

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# PLATE III.

## CASE XI.—Chronic Albuminuria—connection with degeneration of the Arteries of the Brain and Heart-fibre, p. 132.

FIG.

1.—Cast slightly granular, containing nuclear granules, and two fatty abortive epithelial cells, a few larger epithelial cells natural, and some vesical epithelium.

2.—Slightly granular casts, containing free nuclei, compound granule-cells, and abortive epithelium, some crescentic clusters of nuclei.

3.—Casts becoming less granular, many free nuclei, and compound granule-cells.

4.—The deposit here exhibits the same character as is represented in figs. 1, 2, and 3. The casts are still more transparent, the free nuclei more numerous.

5.—Heart-fibre from left ventricle—some fibres in a state of fatty degeneration, others presenting the ordinary striæ.

6.—A blood-vessel teazed out with needles under water from the neighbourhood of the hæmorrhage in the pons varolii. The coats are studded with fat-granules, which remained unchanged in dilute hydrochloric acid, but were dissolved in ether.

7.—Epithelial cells from the calyces and pelvis of the kidney—natural.

8.—Epithelial cells from the fluid squeezed out from the apex of a cone.

*a.*—Epithelium from a straight tube.

*b.*—Epithelial cells, fatty and abortive.

*c.*—Grape-like and crescentic clusters of nuclei from broken-up cells.

9.—A portion of the cortical layer teazed out with needles. The convoluted tubes are filled with fine granular deposit, mixed with many free fat-cells. The epithelial cells appear highly granular, and many are detached, or set free from the basement membrane.

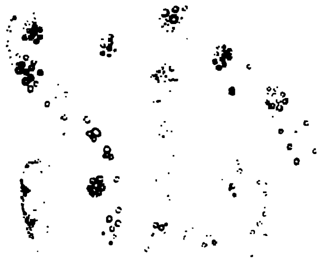
10.—Straight tubes from the apex of a cone. The epithelial structure is natural, but the interior of the tube appears blocked up with granular deposit, free nuclei and granule-cells.

11.—Convoluted tubes from the cortex of the kidney. Portions of the basement membrane are denuded of epithelium, and replaced by fine granular and fatty deposit.

12.—A tube from the cortical part, showing the manner in which the cells appear to become detached as soon as the canal is set free. The cells appear abortive or atrophic, and are surrounded by a granular material, loaded with free nuclei and fat-granules.

*a.*—Some large granule-cells impacted in this granular exudation.

Fig. 1



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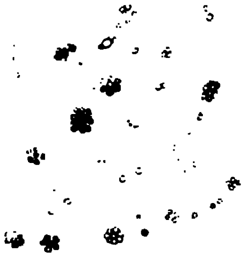

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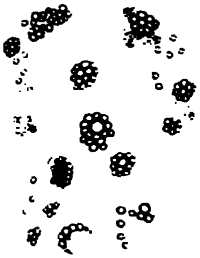

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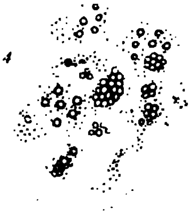

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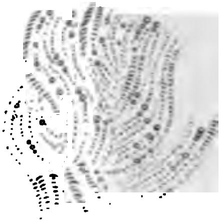

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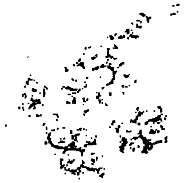

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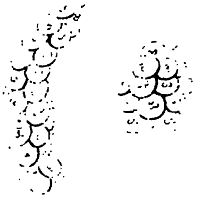

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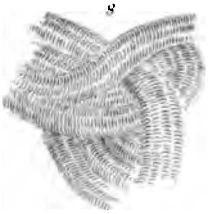

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# PLATE IV.

## CASE XVIII.—Chronic Bright's Disease, p. 162.

FIG.

1.—Casts partially granular, containing fatty or abortive epithelial cells; free fat-granules; a cast with epithelium, natural in appearance; scales of vesical epithelium, containing fat.

2.—Transparent casts, containing fat-granules in greater abundance; epithelial cells in an advanced state of fatty degeneration; a few unchanged epithelial cells; many free nuclei.

3.—Transparent casts containing epithelium more advanced in degeneration; fat-granules coalescing together; glomeruli (when occurring in great abundance, a sign of rapidly advancing degeneration); many free nuclei.

4.—Appearance of a section of one of the roe-like granulations made perpendicular to the surface. The Malpighian bodies appear filled with a fatty and molecular exudation. The convoluted tubes less so. Many abortive epithelial cells and clusters of fat-granules.

## CASE XII.—Acute Albuminuria in connection with Lung Disease, pp. 138, 142.

5.—Malpighian bodies distended and filled with blood; the convoluted tubes also contain blood.

## CASE XIII.—P. 146.

6.—Convoluted tubes from the cortical part of the kidney, quite healthy.

7.—Straight tubes from one of the cones, quite healthy.

8.—Muscular fibre from the left ventricle, well nourished and healthy.

## CASE XIV.—Albuminuria and Inflammation of the Lungs, p. 148.

9.—Convoluted tubes from the cortex, filled with molecular exudation stained with hæmatin.

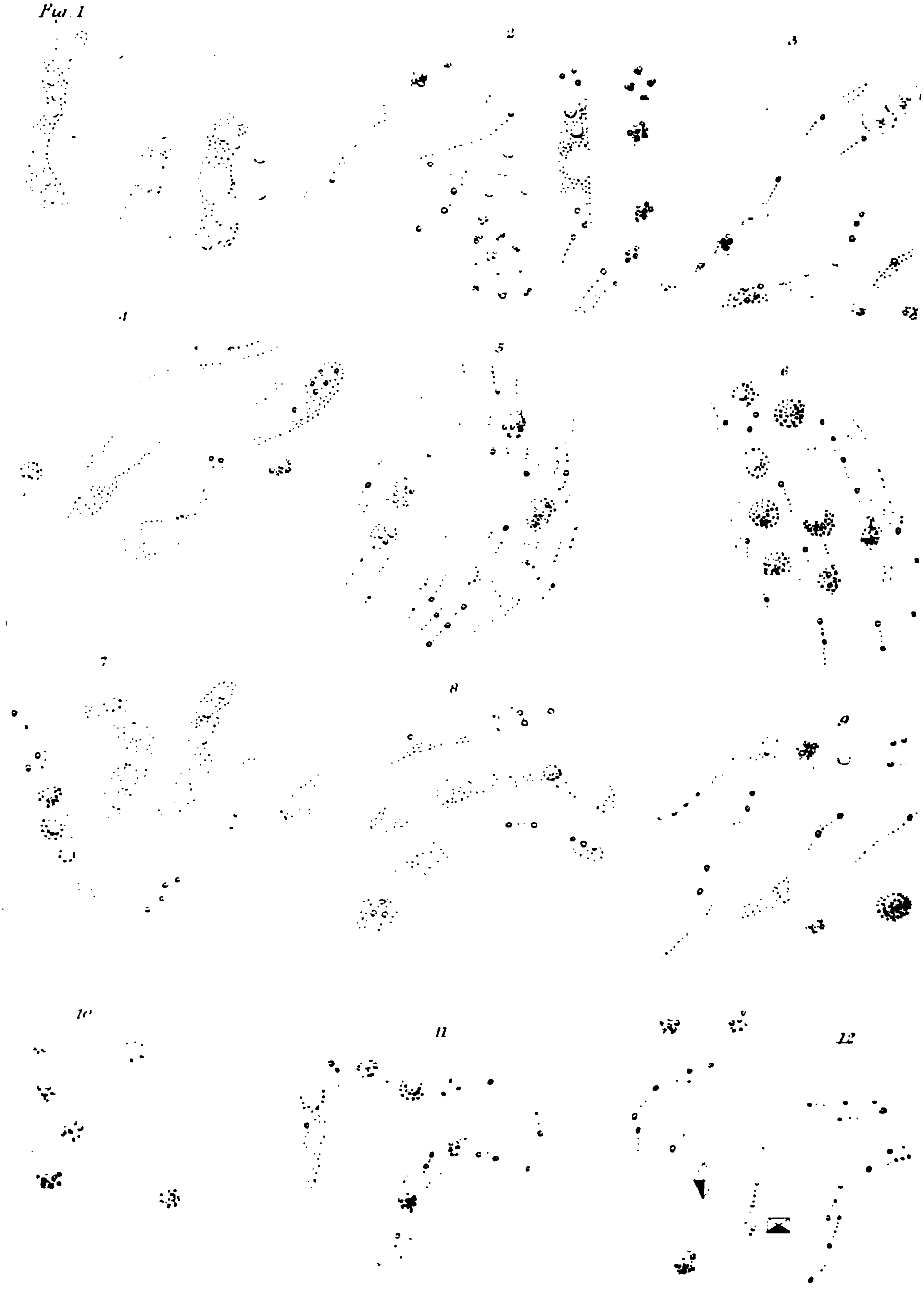
10.—Heart-fibre, very granular and fatty.

## CASE XXX.—P. 253.

11.—A pus-cast; an aggregation of pus-cells not unfrequently accompanying these casts.

12 (P. 347).—Very delicate hyaline casts; this form frequently exhibits fissures or breaks in its outline; it is unaccompanied by any evidence of cell-structure. It is given off by the gouty kidney chiefly (see p. 337).

PLATE



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# PLATE V.

## CASE XV.—Hæmaturia—Albuminuria, remediable cases, p. 154.

FIG.

1.—Fibrinous casts, containing blood-discs and epithelium; one slightly transparent, with scattered epithelial cells and blood-discs.

2.—Several very transparent casts, with scattered free nuclei, with one or two compound granule-cells—a cast partly granular with a few free blood-corpuscles. A group of exudation-corpuscles. The cast which contains the compound granule-cells has at its extremity four exudation- or pus-corpuscles.

3.—Vesical epithelium; granule-cells adhering, bead-like, and prolonged into a transparent film of what looked like mucin. This film-like elongation was less in diameter than that of the cells. Several other similar casts.

4.—Casts partly granular and partly transparent. Free nuclei and epithelial cells. One cast granular at one end, and terminating in transparency.

5, 6.—Bronchial catarrhal mucus, compound granule-cells, buccal, laryngeal, and bronchial epithelial cells, imbedded in a viscid, glairy mucus, abounding in minute molecular granules and free nuclei.

## CASE XVI.—P. 156.

7.—Fibrinous casts, containing blood-discs. Casts faintly granular, containing free nuclei and epithelial cells.

8.—Casts becoming less granular, partly hyaline, containing blood-discs and epithelium.

9.—Casts very transparent, with only here and there an epithelial cell, one or two compound granule-cells.

10.—No casts visible—a few scattered epithelial cells from tubuli—a few compound cells.

## CASE XVII.—P. 159.

11, 12.—Represent the same hyaline casts with a crystal or two of oxalate of lime. These transparent casts contain a number of free nuclei.

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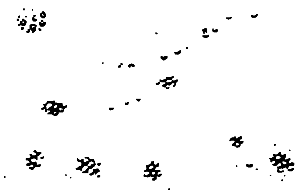

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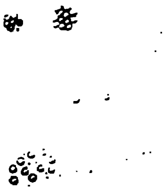

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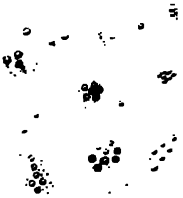

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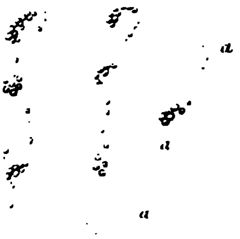

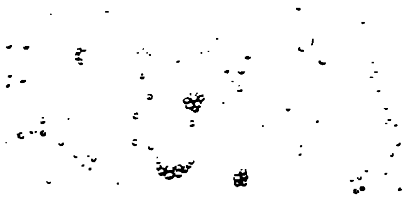

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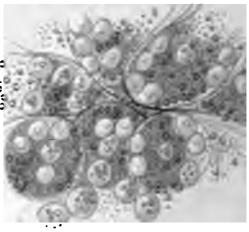

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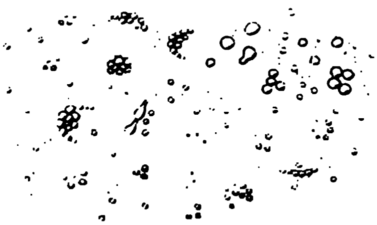

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# PLATE VI.

## CASE IX.—Chronic Albuminuria; fatal, p. 126.

FIG.

1.—Urine, orange coloured, abundance of lithates, highly albuminous. Casts partly transparent, partly granular; highly resplendent free nuclei dispersed through them; many nuclei aggregated together, without a cell-wall.

2.—Casts very transparent; many free nuclei; at the extremity of one, numerous fat-granules and grape-like clusters of nuclei without a cell-wall.

3.—Casts slightly granular, a crystal of lithic acid imbedded in one; many free nuclei, both in the casts and scattered over the field. Casts studded with granule-cells.

4.—Casts more or less transparent; several very large compound granule-cells; free nuclei in abundance, and grape-like clusters of nuclei without a cell-wall. The granular matter occurred chiefly in contiguity with the free nuclei, arising probably from the breaking-up of abortive cells.

5.—The casts very transparent, containing a few free nuclei, small granule-cells, and nuclei aggregated together without a cell-wall.

6.—Casts very transparent and faint; many free nuclei in grape-like clusters, and large compound cells; many aggregate nuclei without a cell-wall.

7.—Casts very transparent; compound granule-cells, very large.

*a*, *a*.—The cell-wall apparently just ruptured.

Pavement-epithelium very granular.

8.—Casts very delicate and translucent; free nuclei and large compound granule-cells.

*a*, *a*, *a*.—The cell-wall of more than one of these appears just ruptured, as in fig. 7: and the contents of the cell, as of some viscid material like mucus, seemed drawn out in an elongated film.

## CASE XXV.—Relation of Bright's Disease to Phthisis, p 221.

9.—Hyaline casts, with free nuclei, fat-grains, and abortive epithelium. A week before death.

10.—Fluid squeezed out by pressure from one of the cones; various forms of epithelium—*a*, *a*, from the straight tubes,—*b*, *b*, from the calyces, many free nuclei, and compound fat-cells.

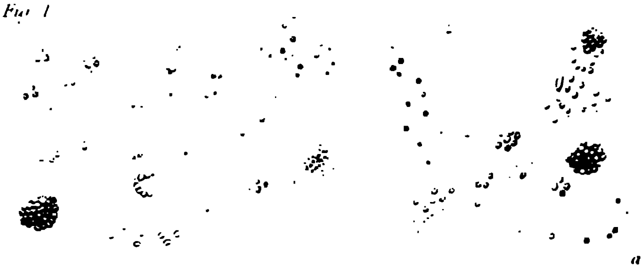
11.—Tubes from the apex and base of one of the cones; *a* and *b* are the same tube from the apex, under variations of focus—the canal seems to contain many free nuclei; *c* is a tube from the base of the cone. The epithelial cells in spots are detached from the basement membrane, the canal seems obstructed by granular matter, free nuclei, and abortive cells; *d*, *d*, are epithelial cells from the straight tubes becoming fatty and abortive.

12.—The appearance presented by a section of one of the more prominent and larger granulations of the surface of the kidney. The Malpighian bodies appear choked with granular matter, free nuclei, fat-grains, and abortive epithelium, and to be imbedded in a fibrilloid matter which might be viewed as new product.

13.—Appearance of the soft central portion of the yellow deposit in one of the cones. Large compound cells, much free fat, granular matter, and abortive cells, such as are usually seen in softening tubercle.

14.—Muscular fibre from the left ventricle, partly fatty and degenerating.

Fig. 1



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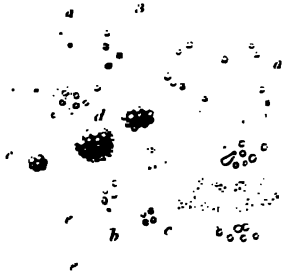

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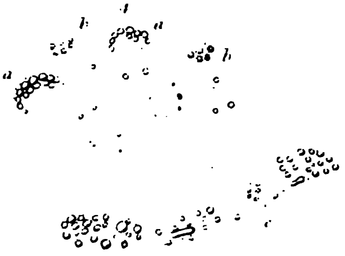

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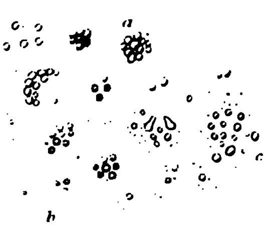

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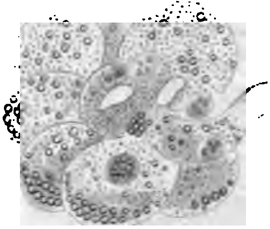

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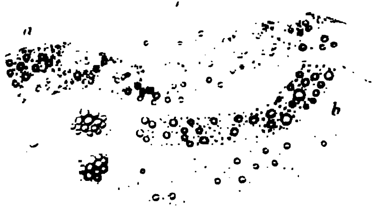

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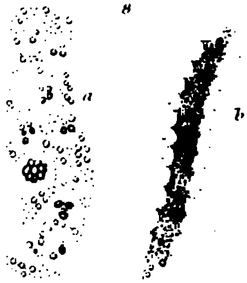

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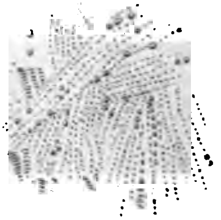

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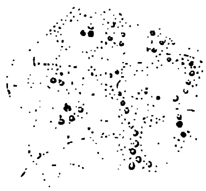

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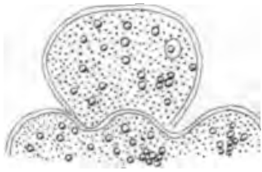

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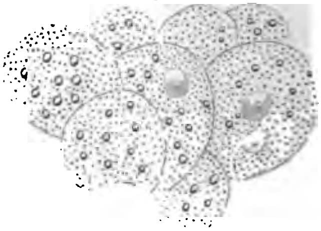

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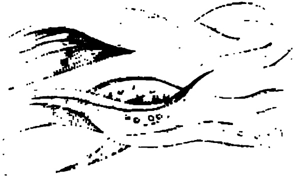

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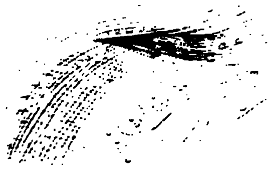

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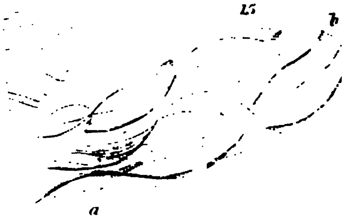

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# PLATE VII.

## CASE XXVI.—Relation of Bright's Disease to Phthisis, p. 225.

FIG.

1.—Urinary deposit composed of faintly granular casts, containing free nuclei, abortive or atrophic epithelial cells, vesical epithelium, fatty; a large compound cell (Gluge's corpuscle), and a crescentic group of granules.

2.—Urinary deposit seven days later. Finely granular tubes containing much free fat and fatty cells. Epithelium of the pelvis and bladder implying fatty decay.

3.—Mucoid or viscid deposit a few days later, composed of masses of several varieties of epithelial cells, all having the appearance of fatty decay.
- *a, a, a.*—Squamous epithelium from the bladder.
- *b, b.*—Epithelium from pelvis of the kidney.
- *c, c.*—Abortive epithelial cells.
- *d.*—Glomerulus or compound fat-cell.
- *e.*—Crystals of lozenge-shaped uric acid.

A great deal of free fat and granular matter dispersed over the field.

4.—Deposit within the last week of life.
- *a.*—Large compound fat-cells, disintegrated or broken up.
- *b.*—Abortive and fatty epithelial cells.
- *c.*—A cast highly fatty, even oily; one or more crystals of uric acid present.

*Post-mortem.*

5.—One of the wax or spermaceti-like grains on the cortical surface of the kidney.
- *a.*—Large compound cells, some broken up.
- *b.*—Abortive and fatty epithelial cells.
- *c.*—Free fat-granules mixed with oily drops and amorphous granular matter dispersed over the field.

6.—One of these minute spermaceti-like granules carefully picked out. The convoluted tubular structure was still obscurely visible; the whole appeared a dense deposit of fat-grains and granular matter; some large compound cells were visible.

7.—Microscopic appearance of one of the striated wax-like like lines of the cortical part, its direction perpendicular to the surface.
- *a.*—The appearance was that of a tube filled with free fat, and abortive and fatty epithelium.
- *b.*—A tube containing nothing but free fat and granular matter.

8.—Tubes teazed out from the mammary cones.
- *a.*—From the base of the cone. A tube filled with compound cells, abortive and fatty epithelium, free fat, and granular matter.
- *b.*—A tube from the apex of the cone. The appearances differ but little from the healthy structures. The canal seems filled with fat-cells and granular matter, but the epithelium of the tube appears not to have passed into the stage of fatty degeneration, save in one or two of the cells.

9.—Muscular fibre of left ventricle, fatty and degenerate.

## CASE X.—Chronic Albuminuria, Nodulated Kidney; fatal, p. 130.

10.—Convoluted tubes from base of one of the cones. Some epithelial cells are detached from the basement membrane, and appear imbedded in granular matter and free nuclei; others appear unchanged and still adherent to the tube.

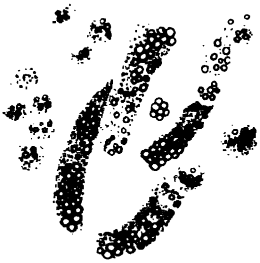
11, 12.—A vertical section of one of the tubercles on the surface of the kidney. Fig. 11 is probably a dilated Malpighian tuft, filled with granular matter and free fat-grains. Convoluted tubes filled with the same material.—Fig. 12 shews convoluted tubes filled with the same.

13.—A portion of the denser part of the cortex, teazed out with needles. The appearance is that of a tubular structure, empty, flattened, condensed, &c.

14.—A section of the more dense part at the base of one of the cones. It exhibits the character of a fibrous stroma, a portion having the appearance of condensed and atrophied tubular structure. A good deal of free fat was dispersed through it.

15.—A part of the least condensed portion of the last section, teazed out with needles. The appearance is that of an original tube-structure, as at fig. 13, flattened and ribbon-like. A few isolated nuclei and some fat-granules are apparent, but all vestige of the epithelial structure lining the tubes is lost.

Fig. 1.



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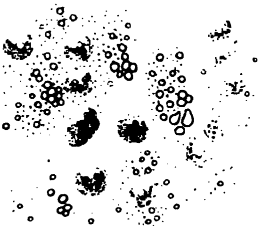

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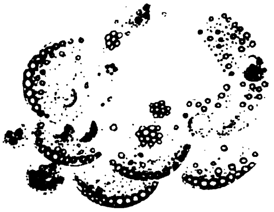

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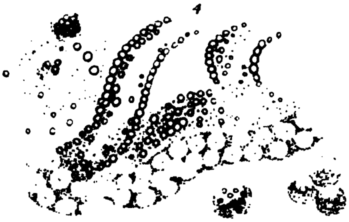

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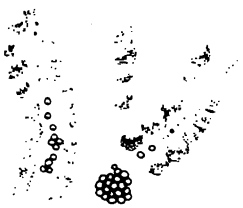

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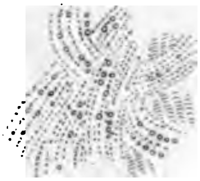

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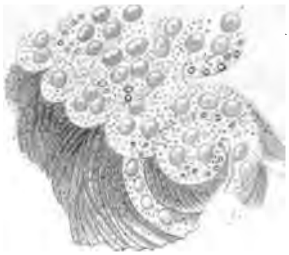

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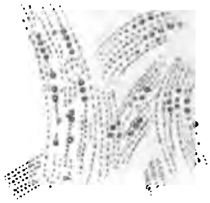

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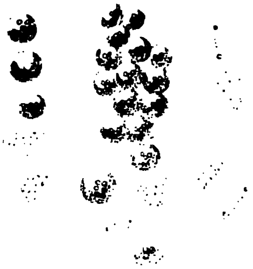

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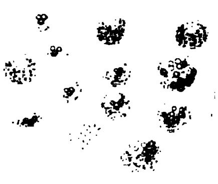

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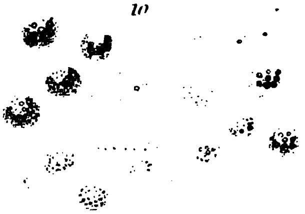

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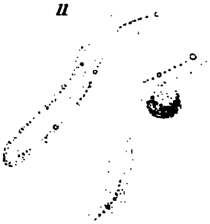

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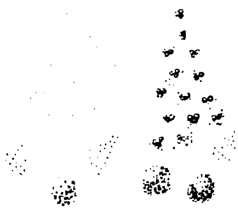
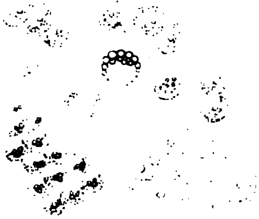
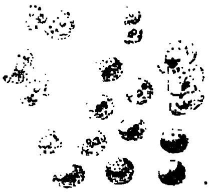


14 March 20



15 March 29



R. R. Basham ad nat. delt.

W. Greatbach sculpt.

# PLATE VIII.

## CASE XXVIII.—Cancer, in connexion with morbus Brightii, p. 228.

FIG.

1.—Sediment from the urine about ten days before death. Highly granular casts, loaded with free fat-molecules; fatty and abortive epithelial cells.

2.—The turbid juice squeezed from the apex of one of the cones, consisting of granular matter loaded with fat; epithelial cells of the straight tubes but little altered.

3.—Convoluted tubes teazed out of the cortical part, loaded with fat-grains; many compound fat-cells are present; some epithelium more or less abortive.

4.—Other tubes from the cortical part. Several contain nothing but fat-grains; others appear choked with cells much smaller than the ordinary glandular epithelium, with a single nucleus; a few compound fat-cells.

5.—Tubes from the apex of one of the cones. The epithelium lining the tubes is natural in appearance; the canal of the tube contains some fat-cells and free fat.

6.—Heart-fibre from left ventricle. But very few transverse muscular striæ visible.

## CASE XXXVII.—Atrophied kidney, p. 327.

7.—Microscopic appearance of one of the nodules on the cortical surface of an atrophied kidney.

The epithelial cells appear detached from the basement membrane. They are small and abortive and are surrounded by, or imbedded in, a fine molecular granular matter, the débris of broken-up cells, ready to be washed away by the urinary current.

The convoluted tubes still visible are in close apposition with a dense fibrous-looking material, in which the remains of tube-structure can be obscurely traced.

8.—The heart-fibre, highly granular and fatty.

## CASE XI.—Chronic Gout, p. 337.

9.—Sediment in the urine of a patient suffering from chronic gout. Exudation or mucous corpuscles; compound granule-cells; amorphous crystals of uric acid (uric acid sand or grit); granular flakes stained with hæmatin.

10.—Very hyaline casts, with compound granule-cells.

11.—Very hyaline casts, unaccompanied by cell-structure.

## CASE XXVIII.—Albuminuria without tube-casts. Character of the urinary sediment in the non-tubular form of renal Dropsy, pp. 238—9.

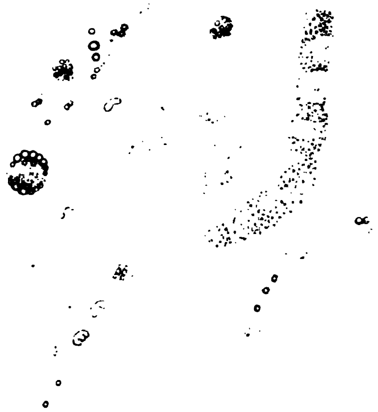
12.—Pus-cells accompanied by one or two delicate looking films, distinctly non-tubular; a few membranous shreds stained.

13.—The same a few days later; some large granule-cells and vesical epithelium.

14.—Similar appearances; a few cells from the pelvis of the kidney; a compound granule-cell in process of disintegration.

15.—Similar forms a day later; cells becoming slightly granular.

*Fig. 1 March 27.*



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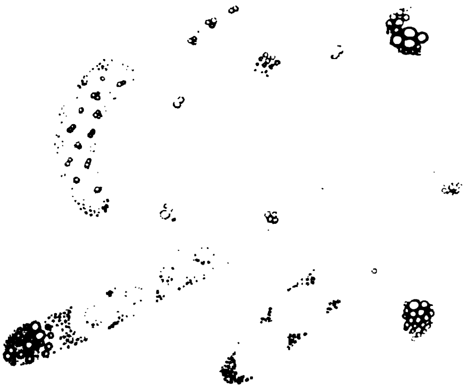

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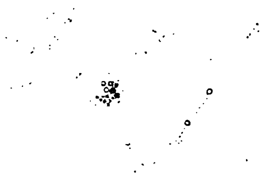
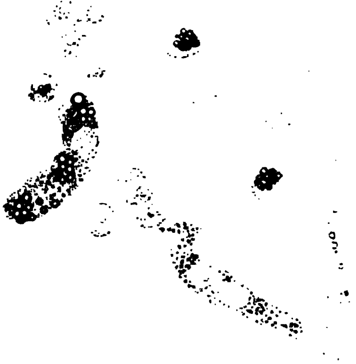
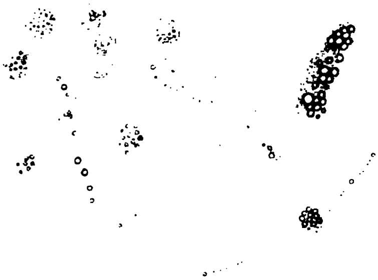


*4 April 7*



*5 May 7*



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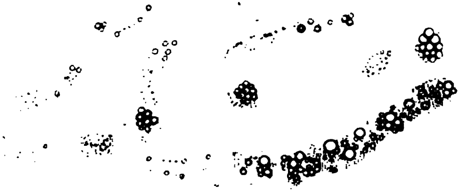
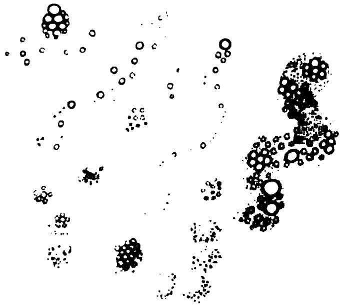


*7 June 1*



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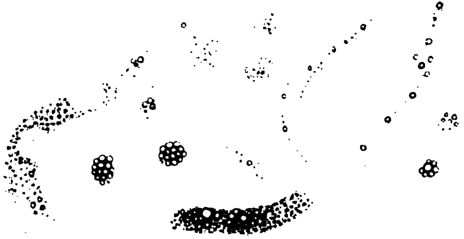


W. R. Basham ad nat del.t

W. Greatbach sculp.t

# PLATE IX.

## Case XXVII.—Morbus Brightii in connection with Pregnancy, p. 233.

**Fig.**

**1.—Various forms of casts—granular epithelial cast; epithelial fatty cast; compound granule-cell; cast containing cells, the nuclei of which are reniform.**

**2. Sediment a few days later; fatty decay more apparent.**

**3, 4.—Forms of casts observed during the progress of the case. The whole series presenting the epithelial cells under various and unpromising modifications.**

## Case XXIV.—Bright's disease, curable, p. 205.

**5.—A few pus- or exudation-corpuscles; large granular compound corpuscles; casts very hyaline, with many free nuclei; a very oily and granular cast.**

**6.—Hyaline casts, containing free nuclei; botryoidal clusters of nuclei, and epithelial cells granular and abortive; one cast very granular and fatty.**

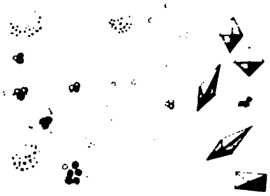
**7.—Same appearance as the last, except that a few epithelial cells are seen, approaching the character of standard epithelium; very fatty casts are still present.**

**8.—The fatty casts were not so numerous or so oily; several disintegrated compound cells. The healthier looking epithelial cells are more abundant; these improved appearances corresponding with subsidence of the dropsy, and a diminution of the albumen in the urine.**

*Fig. 1. June 1855*

*2 Oct. 55*

*3 April 57*



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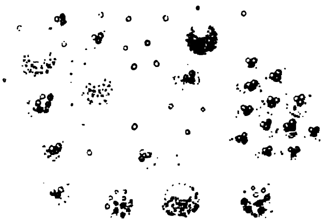
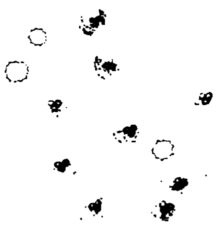


*5 April 58*



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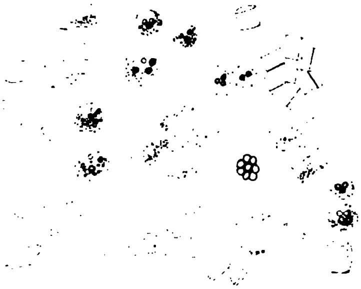

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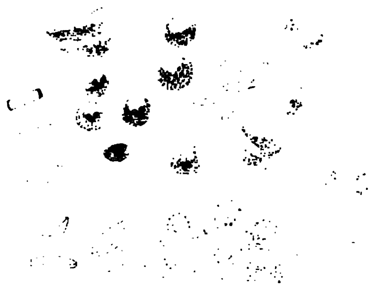

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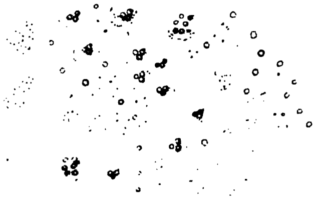

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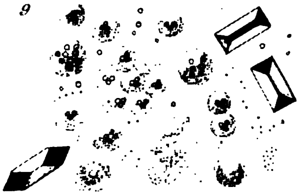

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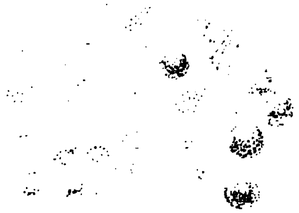

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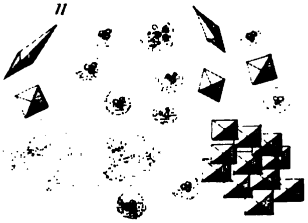


*W. R. Basham ad nat. del^t.*

*W. Greatbach sculp^t.*

# PLATE X.

## CASE XLI.—Renal Calculus; Calculous Pyelitis, p. 357.

Figs. 1 to 7 represent the usual character of the sediment in stone in the kidney; isolated blood-discs are present more or less in the early stage, giving place to mucous and pus-cells, and crystalline forms as the disease advances.

FIG.

1.—Pus-cells; flakes of amorphous fibrine; blood-corpuscles; groups of granular exudation-corpuscles; free nuclei.

2.—Pus-cells; compound inflammatory cells; large granular cells; uric acid grit, amorphous.

3.—Pus-cells; large granular cells; flakes of amorphous fibrine entangling blood-discs; crystals of oxalate of lime; uric acid grit; blood-discs; free nuclei.

4.—Pus-cells and large granular corpuscles.

5.—Blood-corpuscles and large exudation-cells.

## CASE XXXVI.—Gravel or Red Sand, p. 319.

6.—Epithelium from pelvis and ureters; granular corpuscles; crystals of uric acid; uric acid grit; amorphous.

7.—Same case two days later.

## CASE XLVI.—Tubercular Pyelitis, p. 387.

8.—Pus-cells; compound inflammation-corpuscles; free nuclei; granular matter diffused over the field; amorphous fibrinous flakes; epithelial scales from the bladder; a few crystals of uric acid.

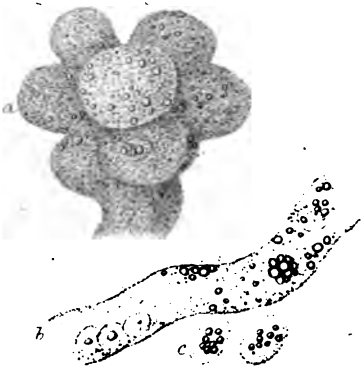
9.—Pus-cells; compound inflammation-corpuscles; amorphous fibrinous flakes, and crystals of triple phosphate.

10.—Blood-discs. Amorphous fibrinous flakes. Epithelial cells from the pelvis of the kidney; vesical epithelium and large compound granule-cells.

11.—Pus-cells. Compound granular corpuscles. Epithelial cells from the bladder. Crystals of oxalate of lime.

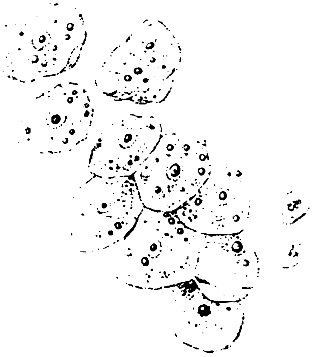
# Morbus Brightii.

Fig: 1.



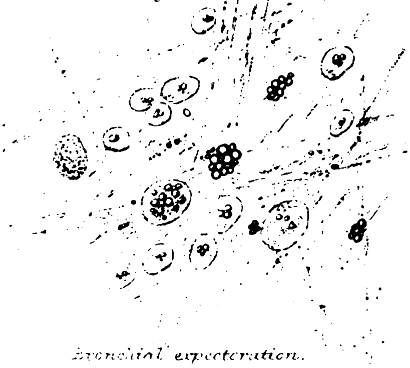
*a Convoluted tubes, filled with fat granules and granular matter.*
*b Straight tube, filled with debris of cells, &c.*
*c Gluge's inflammatory corpuscles.*

Fig: 2.



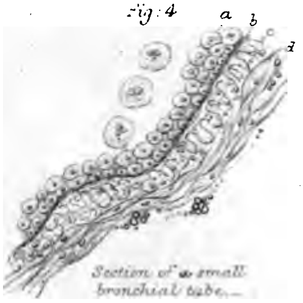
*Vesical & urethral epithelium, granular & fatty.*

Fig: 3.



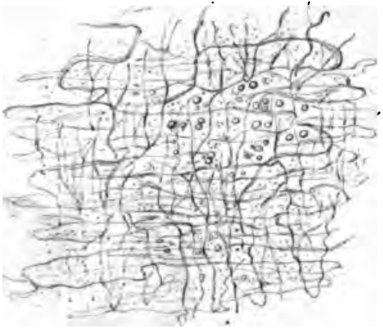
*Bronchial expectoration.*

Fig: 4

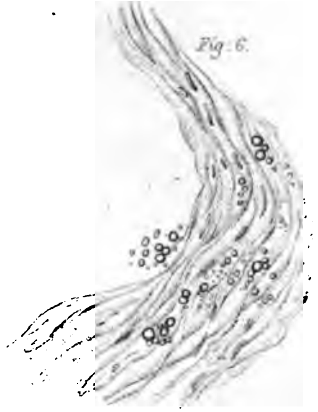


*a. Layer of epithelial cells.*
*b. Germinal or basement membrane.*
*c Layer of fibro elastic tissue.*
*d. Layer of unstriped muscle.*

Fig. 5.



*Fibro elastic layer of smallest bronchial tubes more highly magnified & slightly fatty. +350.*



*Layer of unstriped muscle also fatty, more highly magnified +350.*

W. R. B. ad natᵐ del.

W. West. lithʳ

# PLATE XI

## Represents the general character of the degeneration of tissue in morbus Brightii, p. 39.

**Fig.**

**1.**—Exhibits the granulations on the cortical surface of a granular kidney; these granulations appear to be formed by the convoluted tubes becoming filled with an exudation matter mixed with fat-grains, apparently derived from the breaking up of imperfect and abortive cells. One of the larger straight tubes of Bellini appears filled with fine granular matter and the débris of cells.

**2.**—Vesical and urethral epithelium, granular and fatty.

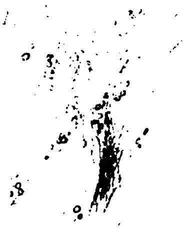
**3.**—Bronchial expectoration in morbus Brightii. The cellular elements do not differ from those seen in the urinary sediment derived from the kidneys, except that a greater variety of modified cells is apparent.

**4.**—Is a section of a bronchial tube in morbus Brightii. It is typical of the state of those tissues in all cases of renal dropsy. The epithelial cells, as layer after layer come to the surface, never reach the full development of the ciliated epithelial cells, but degenerate into the mucous or pus-corpuscles generated in such abundance.

**5, 6.**—Are more highly magnified examples of the fatty conditions of the fibro-elastic and unstriped muscular layers.

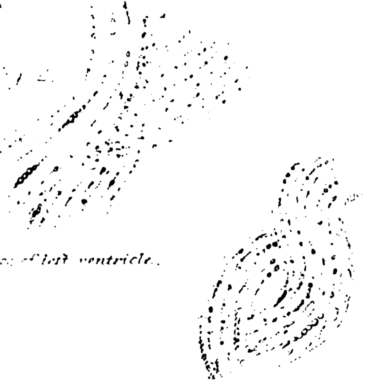
# Degeneration of tissue. Morbus Brightii
## Heart-fibre

Fig. 1.



*Macula albida.*
*Fat spot from pericardium.*

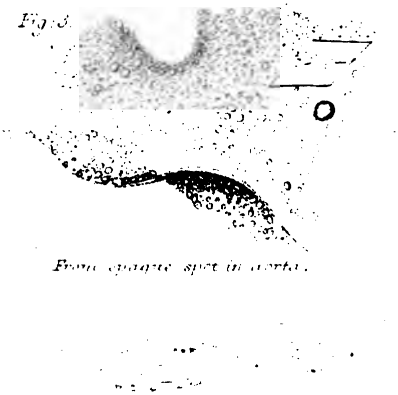
Fig. 2.



*From substance of left ventricle.*

*From fleshy column of right auricle.*

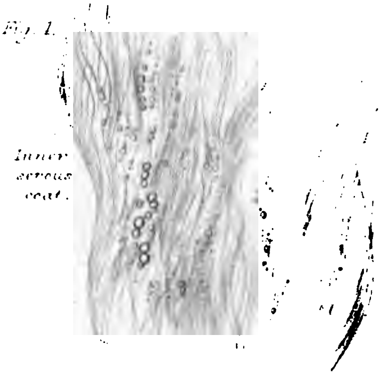
Fig. 3.



*From opaque spot in aorta.*

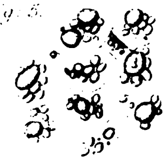
*Inner serous layer.*

Fig. 4.



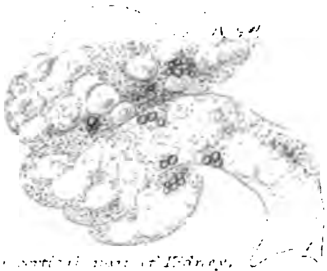
*A vertical section through the aorta.*

Fig. 5.



*Liver [illegible]*
*[illegible] in liver cells*
*[illegible]*

Fig. 6.



*From cortical part of Kidney, [illegible] tubes filled with granular matter; cells detached from germinal or basement membrane.*

G.R. [illegible] del. W. West lith.

## PLATE XII

### Represents the degeneration of tissue in the organs of circulation in Bright's Disease.

FIG.

1.—Indicates that the milk-spots on the surface of the heart so often seen in morbus Brightii, result from a degeneration of the serous membrane.

2.—In every fatal case of morbus Brightii the heart-fibre of either side of the heart will be found characteristic of degeneration.

3.—Opaque patches in the aortic sinus and in the endocardial membrane are very common in morbus Brightii. They are very characteristic of a fatty state of the tissues. Plates of cholesterine mixed with innumerable fat-grains are readily seen with the microscope. 4.—Is a vertical section through one of these opaque patches in the aorta.

5.—Represents the state of the liver-cells, typical of what is all but universally seen in renal dropsy.

6.—Represents the convoluted tubes of the kidney in chronic morbus Brightii; the epithelial gland-cells are almost everywhere detached from the basement or germinal membrane, and the tubes appear filled with these cells and granular matter and fatty nuclei derived from the breaking-up of the most abortive.

Plate 23.

# Sputa.

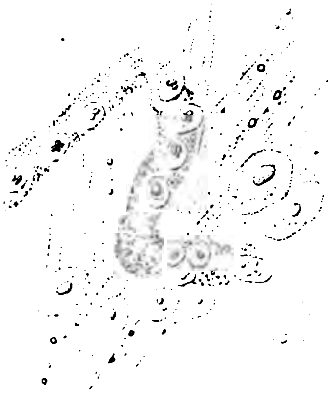
Fig. 1.

*Simple Catarrh.*
*Hyaline appearance of sputa*

Fig. 2.

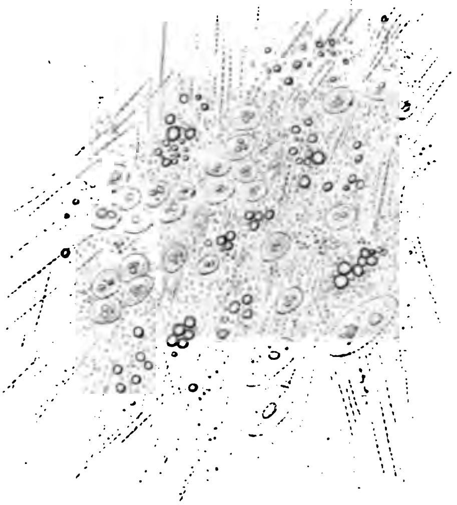
*Plastic Bronchitis*
*Fibrinous casts of the air cells*

Fig. 3.



*Capillary Bronchitis.*
*Granular appearance [illegible]*
*[illegible]*

Fig. 4.



*Phthisis.*
*Various forms of mucous cells with*
*pus cells & large debris of disintegrated*
*alveolar cells.*

R. B. ad nat^m del.

W. West, lith.

# PLATE XIII

Represents the character of the sputa in various pulmonary disorders, with the object of showing that the cellular elements thrown off from the bronchial mucous membrane, in various pulmonary disorders, are strictly analogous to what is derived from the renal tubes in diseases of the kidneys, pp. 38, 39, 53.

FIG.

1.—Represents the hyaline or transparent characters of the sputa in ordinary catarrh. The hyaline and transparent casts in the curable forms of morbus Brightii are strictly analogous. Compare figs. 10, 11, 12, Plate V.

2.—Represents the shreddy fibrinous sputa in plastic bronchitis, similar in character to the fibrinous casts in the earlier stage of acute morbus Brightii. Compare Plate II, fig. 2.

3.—The sputa in capillary bronchitis, with characters somewhat similar. The cellular elements are almost identical.

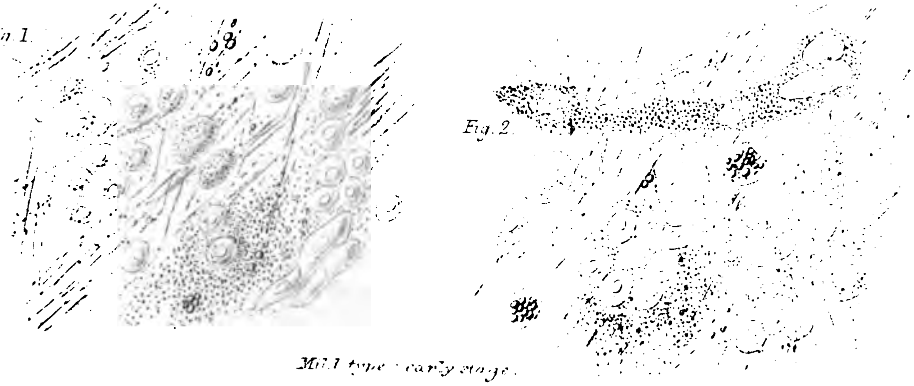
4.—Is the character of the sputa in phthisis. Compare the figure with the sediment of the urine in a case of renal dropsy complicated with cancer or phthisis. See Plate VIII, figs. 1, 2.

Plate 14.

# Sputa. Pneumonia.

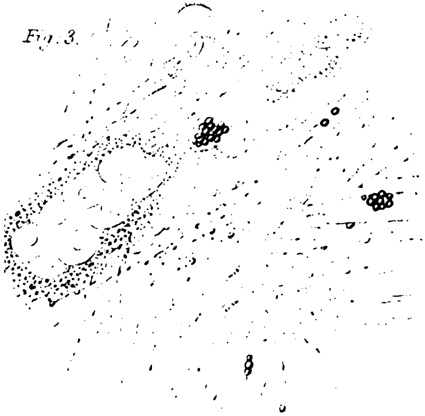
Fig. 1.

Fig. 2.



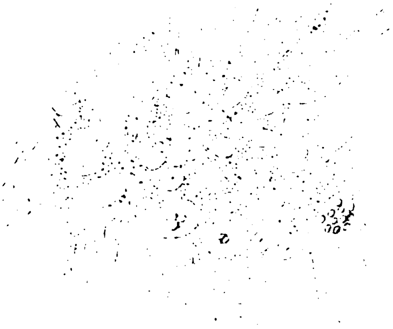
*Mild type - early stage.*

Fig. 3.



*Sputa viscid, yellow orange.*

Fig. 4.

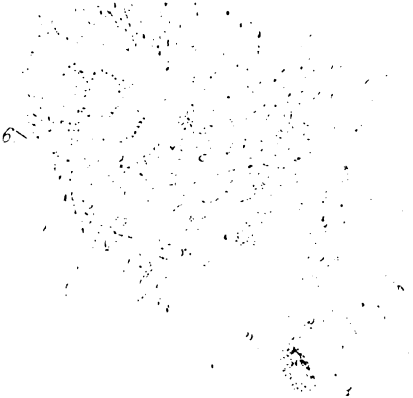


*Sputa viscid; rust coloured.*

Fig. 5.

[illegible]

Fig. 6.



[illegible]

[illegible]

# PLATE XIV.

## The sputa in pneumonia, of different degrees of intensity, typical of the several forms of casts in the acute form of renal dropsy, particularly those cases which commence with inflammatory engorgement of the kidneys, with evidence of hæmaturia of greater or less degree, pp. 39, 40.

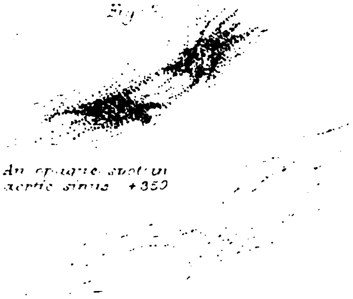
FIGS.

1, 2, 3.—Illustrate the milder form, in which the sputa acquire a tinge scarcely deeper than an apricot yellow. It is apparent that this yellow stain arises from certain cells only, large ovoid cells taking up the colouring matter derived from the blood stasis. These cells are those which are sometimes called pigment-cells, from their acquiring and giving to the sputa in bronchial catarrh the steel-gray colour so familiar to us. The ciliated epithelial cells which are first thrown off do not appear stained, nor even the mucous corpuscles.

4, 5.—Represent the sputa in the severer forms of pneumonia, when they become viscid and rust-coloured, or even more deeply tinged. Here all the cells appear more or less stained, as, from the presence of blood-corpuscles, a greater abundance of hæmatin is poured out. The scaly epithelium from the mouth and cheeks is usually free from colour. These forms of sputa have their analogue in the blood-casts of the earliest stage of acute morbus Brightii. The cellular elements are similar in each, and may be verified by examining the urinary sediment in the blood-stained urine after scarlet fever. See Plates I and II, and figs. 1, 2, &c., &c.

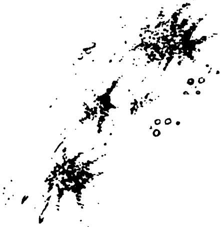
Plate II. Calcification and fatty decay of Tissues

Fig 1.



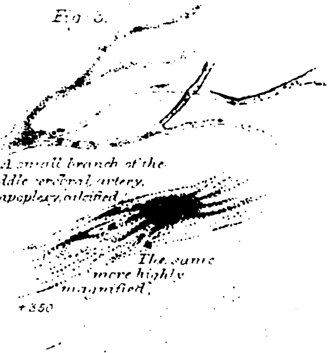
An opaque spot on aortic sinus +350

After digestion in Hydro-chloric acid.



An opaque spot on [illegible]
+350

Fig 3.

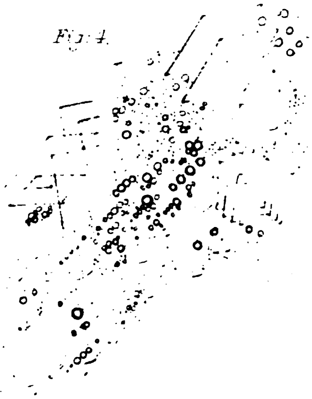


A small branch of the middle cerebral artery, in a case of apoplexy, calcified.

The same more highly magnified.
+350

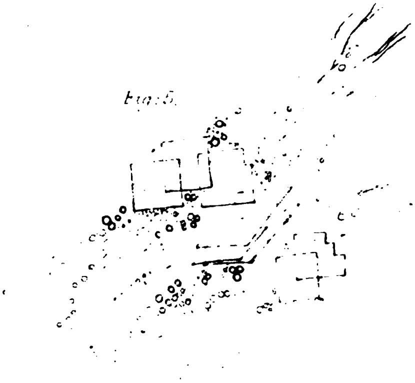
After digestion in Hydro-chloric acid.

Fig 4.



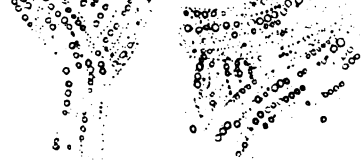
An opaque patch on mitral valve.

Fig 5.



An opaque patch on the margin of the tricuspid valve.

Fig 6.



Right ventricle. Left ventricle.
Heart-fibre, highly fatty.

[illegible]

# PLATE XV

## Represents the character of the changes which take place in the morbid deposits in the heart and arteries in cardiac dropsy, pp. 260—264.

FIG.

1.—Represents the starlike character of an opaque earthy spot on the mitral valve of a case mentioned in the text.

2.—Is an opaque spot in the aorta which had undergone the process of calcification; digestion in dilute hydrochloric acid dissolved the deposit and left the tissue clear. The earthy material is composed of phosphate and carbonate of lime.

3.—Is a deposit of a similar character and composition occurring in a branch of the middle cerebral artery, leading to an apoplectic clot. The rupture of the vessel appeared to have arisen from the loss of elasticity in the coats of the vessel in consequence of the calcification of the tissues.

4, 5, 6.—Are illustrations of the other form of degeneration which the morbid deposit may undergo, leading to dilatation of the cavities and imperfect driving power in the force of the heart.

Plate 16

# Emphysema & Chronic Bronchitis

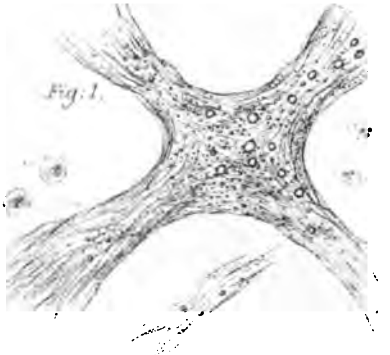


Fig. 1.

Pulmonary tissue from emphysematous lung.

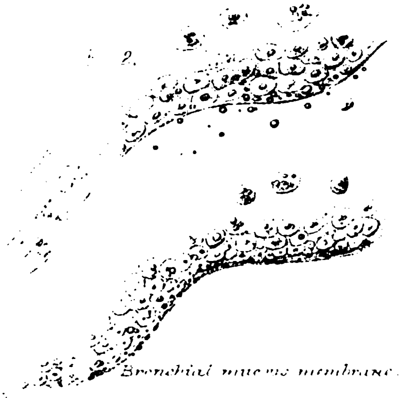


Fig. 2.

Bronchial mucous membrane.

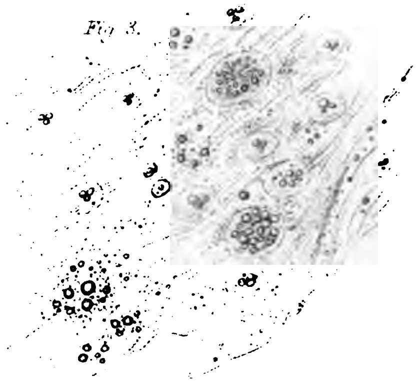


Fig. 3.

Sputa, Chronic Bronchitis with Dropsy.

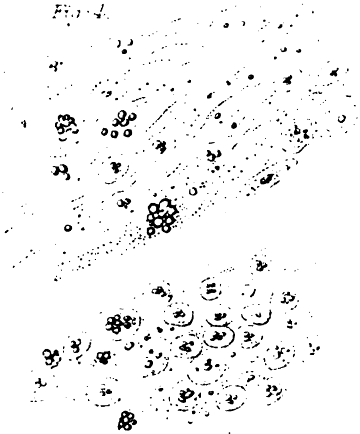


Fig. 4.

Sputa, Emphysema.

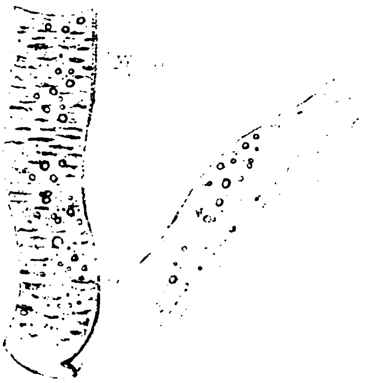


Fig. 5.

Fatty degeneration of small artery
from an emphysematous patient.

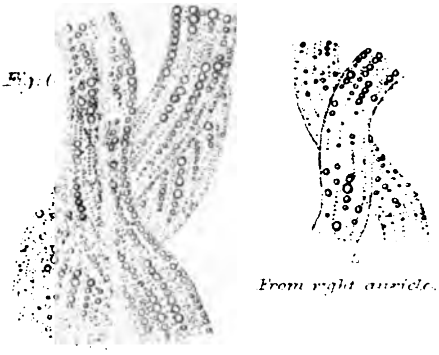


Fig. 6.

From right auricle.

Fragment of ventricle.

Heart fibre.

W. F. Steadman del.

W. West imp.

# PLATE XVI

Represents the fatty decay of the tissues observed in cases of emphysema and chronic bronchitis terminating in dropsy, pp. 268, 269.

Fig.

1.—Is a portion of the vesicular structure of an emphysematous lung, showing the numerous fat-grains deposited in it.

2.—Represents sections of the bronchial mucous membrane, showing the successive layers of cells degenerating as they approach the free surface, to be thrown off as mucous and pus-corpuscles mixed with large granule-cells and aggregations of disintegrated nuclei represented in figs. 3 and 4.

5.—Illustrates the fatty condition of the coats of a small artery leading to an emphysematous patch.

6.—Represents a state of fatty degeneration of the muscular fibre of both auricle and ventricle of the right side, and is typical of what may be seen in most cases of dropsy with dilatation of the right cavities, complicated with emphysema and and chronic bronchitis.

# ON DROPSY,

AND ITS CONNECTION WITH

# DISEASE OF THE KIDNEYS.

## PART I.

### KIDNEYS PRIMARILY AFFECTED.

## CHAPTER I.

### INTRODUCTION.

IN a practical point of view there are advantages to be found in selecting a symptom common to several pathological states and investigating its cause, its progress and its consequences. Its significance is better understood, and its indication of the favorable or unfavorable progress of the fundamental disease more clearly appreciated. This proposition is specially applicable to the state which is called Dropsy.

It is not long since writers and practitioners viewed and treated it as a substantive disease. Inattentive to the true significance of the presence of an accumulated fluid in the shut cavities, or diffused through the connective tissue generally, they were content to interpret the presence of dropsy as arising from one of two causes—either increased effusion, or diminished absorption; and regarding the absorbents or veins as alone concerned, these effusions were considered as distinct diseases, and received a place in all nosological systems as special morbid states. Within the last thirty years we may find writers of distinction discussing the treatment of the acute, the plethoric, or the arterial dropsy; advocating bloodletting and remedies to lower the heart's action in one class of cases; but for dropsies from relaxation, or glandular obstruction, remedies to stimulate the absorbents were to be prescribed. Many may remember when such doctrines prevailed and were taught in our schools.

It is, however, now generally admitted that the absorbents occupy a less prominent position in the development of dropsy; and we regard chiefly the state of the capillaries, especially the venous, and impediments to the free passage of blood through them, as the most active and intelligible causes of the transudation of the serous elements of the blood into the tissues.

Hewson says,* "I think we may be led to a more correct notion about the causes of these dropsies, which causes have been supposed to be either an *increased secretion, or an impeded absorption,* or a rupture of a lymphatic vessel, none of which, strictly speaking, give rise to such morbid collections of waters. For if merely an increased secretion, or an impeded absorption, was the cause of an ascites or an anasarca, then the fluid let out should resemble that contained in these cavities in living animals. The same reasoning holds good against these dropsies being occasioned by the rupture of a lymphatic vessel; that is, the fluid evacuated is not similar to what is found contained in those vessels in our experiments, where the lymph jellied on exposition to the air."

Thus Hewson, nearly a hundred years since, in his writings on the lymphatic system, suggested that dropsies were not primary diseases, but the consequences of others; and a diseased liver, spleen, or lungs, which so often accompany these dropsies, are not so properly to be considered as giving rise to them *by causing a rupture of a lymphatic vessel,* or of obstructing the course of the lymph, as *by affecting chylifica-*

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* Hewson's Works, chapter xiii, p. 196.

*tion and sanguification*; for when the liver, for example, is diseased, and the bile deficient in quality or quantity, the food not being properly assimilated, *may make a bad blood*, which may affect the vessels, and may let go its water into these cavities.

And again he says, "that in these kinds of dropsies there is something more than an increased secretion, or an impeded absorption; that is, there is a perversion of the secretion, or the vessels throw out a fluid different from the natural one, which may happen rather from the exhalant arteries being altered by disease so as to change the properties of the fluid (blood) passing through them, or from the mass of blood being *vitiated* or abounding *so much* with *water*."

An impediment to the free passage of the blood through the capillaries may originate in one of three ways, and every form of dropsical effusion may be referred to one or other of them. I exclude from present consideration those forms of serous exudation, which occurring in shut cavities are the sequel or effect of antecedent local inflammation—such as may occur in pleurisy, pericarditis, arachnitis, peritonitis, orchitis, or in arthritic inflammation of joints followed by effusion—in one sense these are dropsies, but they are not comprehended in the diseases of which dropsy is considered a significant symptom.

The three acknowledged causes of dropsical effusion are—

1st. A poor, watery, exhausted blood.
2ndly. The presence in the blood of excrementitious or other noxious material.
3rdly. Impediments to the free passage of the blood through one or other of the great organs—the heart, lungs, or liver.

The dropsical effusion which frequently accompanies spanæmia, and is often seen to result from severe hæmorrhage, particularly after parturition, arises apparently from an impoverished blood: a blood deficient in red corpuscles, but abounding in white colourless cells, the Leuco-cytemia of recent authors. Blood with these qualities appears to pass with difficulty through the capillaries, principally on account of the increased number of the colourless cells, which, larger in size than the red corpuscles, exhibit a remarkable tenacity for adhesion to the walls of the vessels; the immediate effect of which is to produce such an amount of blood stasis as to cause a transudation of the serous elements of the blood, especially in those parts of the body most remote from the influence of the feeble stimulus which poor blood exerts upon the heart.

The inferior extremities, where the force of gravity is greatest, testify earliest to this dropsical condition. This form of dropsical effusion is usually so transient, disappears so quickly under the combined influence of nutrition and steel, that it is not necessary to notice it further. It is to the significance of other forms of dropsy that I desire more particularly to direct attention.

It is now generally admitted that, in the so-called blood diseases, the capillary circulation becomes impeded; so that whenever the blood is charged with morbid material, or is in any way rendered unfit for the processes of nutrition or secretion, a stagnation or imperfect movement through the capillaries becomes manifest, indicated by deviations in the functions as well as in the nutrition of organs and tissues, and especially by the increased frequency of the heart's action, and the laborious efforts made by that organ to force the blood through the sluggish and congested vessels. The result will be febrile disorder, or dropsical effusion, sometimes both, according to the kind or degree of contamination. Ordinary fevers of the so-called zymotic class are examples of the one; the morbid sequel to scarlet fever as well as the acute form of morbus Brightii, may be given as examples of the other. In these, as in the dropsy after scarlet fever, it is presumed that the dropsical effusion arises from the embarrassment which the capillary circulation, both renal and general, suffers from the presence in the blood of uneliminated portions of the scarlatinal poison; while equally in the acute form of morbus Brightii, it is traced proximately to the sudden obstruction of important excretions, the cutaneous and renal quickly generating febrile disturbance accompanied by a diffuse and general infiltration of serum into the tissues.

The third form, or cause of dropsical accumulations permits a more mechanical explanation. It arises from an obstruction to the current of the blood through the heart, lungs, or liver. In this division the cause of dropsy may arise either primarily in the heart—as in valvular disease of the left side,—or primarily in the lungs, and secondarily in the heart—as in emphysema and chronic bronchitis—one or both producing dilatation, and inefficient action in the right heart, and a consequent retrograde effect throughout the venous system. Dropsy from either of these causes is usually recognised as cardiac, and the serous effusion first manifesting itslf in the lower extremities ultimately extends, and accumulates through the whole areolar tissue.

Lastly, the liver may become the seat of obstructive disease to the portal circulation. The effect of the obstruction here, as in cardiac dropsy, is carried back till its effects are felt in the remotest capillaries of this section of the venous system, and ascites follows.

It is little beyond thirty years since our distinguished countryman, Dr. Bright, laid the foundation, by his invaluable and original observations, for a more correct knowledge of these forms of dropsy. Tracing these effusions by post-mortem investigation, he found them significant of diseases of the renal, cardiac, pulmonary, or hepatic organs; and his researches gave a fresh and well-directed impulse to the pathological pursuits of his contemporaries and followers. But while he indicated the true method by which diseases and symptoms should be investigated, the scalpel after the first discoveries and description of morbid appearances could yield but little more. Dr. Bright, however, lived to witness the application of more minute methods of research, and he appreciated highly the results which the microscope was yielding to those who followed in the path he had opened.

It is to the very general employment of the microscope in the examination of the excretions during life, as well as of the structure of the organs and tissues after death, that we must trace the greater part of the progress that is now being made in the pathology and treatment of these diseases.

By this instrument the physiologist has been made acquainted with the structural elements of secreting organs, and has been able to trace to the nucleated element of the cell the source from whence both secretions and excretions are derived. The pathologist, guided in his path by the light and discoveries of physiological science, and employing similar methods of investigation, is laying the foundation for sounder notions of the nature of diseased action than prevailed formerly, and is, successfully I hope, leading the way to more effective treatment, because based on principles less theoretical and less visionary. To the physiologist, then, we must award the distinction of having first demonstrated the nature and functions of the cellular elements of the tissues, and among the foremost, because the earliest of these, must be placed J. Goodsir, whose deductions have been confirmed by all succeeding observers.

The well-known conclusions of this physiologist are, "that all true secretions are formed or selected by a vital action of the nucleated cell; that the secretions are first contained in the cavity of that cell; and he adds that both growth and secretion are identical—the same vital process under different circumstances." These observations have been amply confirmed by other and more recent researches, and among those who have chiefly contributed to establish these conclusions, there are many honoured English names, whose writings may be consulted with advantage:—Mr. Bowman, Dr. Wm. Addison, Dr. Lionel Beale, and others. But it is perhaps to Henle and especially Virchow, the distinguished professor of general pathology and therapeutics in the University of Berlin, that we are chiefly indebted for the extension of the physiology of cells to the interpretation of the phenomena of disease.

It is now universally admitted that the functions of secretion equally with the process of development and growth, are performed through the agency of cells; and that the blood in the capillaries plays simply the part of carrying nutriment and supplying the necessary stimulus and support to cell growth for the purposes of secretion. If then, from the physiological and anatomical point of view, we are taught to recognise the nucleated cell as the fundamental source of the vital processes of secretion and development, so must we from the pathological stand-point equally regard the nucleated cell as involved in the processes of disease.

Accordingly we find that in every direction in which microscopic research has been hitherto made, evidence has been obtained of alterations in the character of the cellular elements—oftentimes proportioned to, and characteristic of special morbid processes; and it has been successfully shown that even the excreta during life contained marked indications of particular forms of disease, so that a microscopic examination of the effete matters thrown off will often guide us to a correct estimate of the character and progress of disease.

The microscope, therefore, as an instrument of investigation should be to diseases of the kidneys, what the stethoscope is to diseases of the lungs. The ear detects, by the aid of the one, the alterations of the sounds of respiration induced by disease; the eye, assisted by the other, sees in the urine materials and products thrown off from the kidneys, which, when carefully studied, become safe and reliable exponents both of the nature of the disease, and of its advance or decline.

The object of the following observations is two-fold: first, to illustrate the aid which the microscope affords in the diagnosis and prognosis of dropsical diseases; and secondly, to exhibit the principles on which remedial measures are found to be most efficient and trustworthy.

But while I have desired to portray the general character and symptoms, as well as the principles of treatment in these diseases, I have been further desirous to ascertain if a more extended signification than has hitherto been accorded might not be given to the tube-casts and cells which are present in the urine in renal dropsy. Whether, in fact, in the specific cell character of these might not be found a more certain guide in prognosis than can be supplied by any other property of the urine, or by any other symptoms exhibited by the patient. From an albuminous state of the urine, coupled with other symptoms, certain morbid conditions of the kidney are inferred; from certain deposits found associated with the albuminous urine a greater degree of certainty and accuracy have been given to diagnosis. These deposits undergo marked alteration and change as the renal disease advances, and it has appeared to me an inquiry of deep practical importance, whether a careful study and record of these modifications of the urinary deposits might not reveal the different stages of these diseases, and become a safe guide in prognosis as well as add another element of certainty to the detection of special forms of renal disorder.

Every one familiar with cases of renal dropsy will readily admit how difficult it is to form a satisfactory, definite, or correct opinion of the rate of progress, the advance or recession of the organic changes in the kidney. He must confess that he is guided in his prognosis by the subsidence of the dropsy, or the diminution of the amount of albumen in the urine; but these symptoms, favorable as they may appear, are by no means conclusive of any radical improvement in the condition of the kidney. In the course of a few weeks the dropsy returns, again abates—returns—and the patient dies.

In diseases of the lungs a physical exploration of the chest enables the physician to estimate with an accuracy proportioned to his experience, the progress of the pulmonary disorder, and I believe the microscope can be made to yield equally reliable evidence in diseases of the kidney. It has appeared to me that if the urinary deposit in diseases of the kidney were constantly examined during the whole progress of the disorder, and drawings of the appearance of the tube-casts and their contents carefully made and compared with each other at different periods of the case; and moreover if drawings were also made of the microscopic appearances of the contents of the tubes in the various forms of renal degeneration after death, we might hope to arrive at data sufficiently determinate to afford us a safe guide for estimating the rate of the progress of the disease, the nature of the organic changes, and the prospect of relief through the agency of appropriate remedies. The diagnosis of these diseases is sufficiently clear; the development and early stage of the disorder are well marked and easily recognised; but even at this stage, data are yet required to enable the physician to decide with any accuracy upon the probability of a cure, permanent or temporary.

When the malady assumes the chronic form, the dropsy, the albuminous urine, the tube-casts, merely testify to the nature and seat of the disease; they but imperfectly furnish the means of estimating the stage of the disease, or the probable power of remedial agencies to suspend or interfere with the progress of the disorder. It has been thought that the increase or diminution of the amount of albumen in the urine would mark the rate of progress of degeneration. It has been thought that an estimation of the amount of solids daily excreted by the kidneys as suggested by Dr. Christison, would be a test of the progressive waste of the tissues, and inferentially of the advance or recession of the disease; but no satisfactory conclusions have as yet been obtained from these methods of investigation. It has not yet been established that the amount of albumen excreted with the urine ever bears any definite relation to the progress of the disease. The albumen in the urine neither augments nor decreases in any certain ratio as the disease advances or recedes. Certainly it gradually diminishes and altogether disappears in curable cases; but it varies much in the more fatal cases. The object of the examination of the urine should be to determine, if possible, the stage at which the disease has arrived. I believe that neither the estimation of the amount of albumen nor the weight of the solid constituents of the urine daily excreted will supply the requisite data on which reliance can be placed for deciding with any degree of certainty the stage at which the renal disorder has arrived, or the rate of progress at which it is advancing. Upon this subject Dr. Owen Rees ('Analysis of the Blood and Urine,' pp. 157, 158) justly remarks, "It is an important point in the investigation of the degeneration of the kidney, accompanied by excretion of albumen by the kidney, whether the proportion of this principal found in the urine, bore any relation whatever to the stage of degeneration to which the kidney had advanced. This relation, however, is wanting, and we yet need a guide, for determining, in many cases at least, in what stage the disease may have arrived when examining our patient."

I freely confess to great scepticism of the practical value (its relation to treatment) of minute attention to the specific gravity of the urine, from which some authors have sought to deduce the amount of solids daily excreted by the kidneys. Independent of circumstances which combine to make me doubt the efficiency of the ordinary method in use, by urinometer, for determining with anything like accuracy the specific gravity of the urine, I am inclined to advance one step farther in heterodoxy, and express my opinion that the specific gravity of the urine, however accurately obtained, must fail to afford any very certain or satisfactory information in relation to the progress of renal disease. There is no animal fluid subject to such hourly variation in regard to its destiny as the urine; so that unless all the urine of the twenty-four hours be collected no truthful result could be obtained. But even when this is done, no practical inference of any importance is obtained; for the specific gravity of the urine, both in health and disease, will vary one day with another, influenced by a variety of extraneous circumstances: the temperature, the density of the atmosphere, its hygrometric condition, the quality of the food, the quantity of fluid drunk, the activity or torpidity of the alvine functions, the amount and nature of the exercise of the body generally;—these will severally influence the density of the urine. It appears almost certain that this great variation in the specific gravity of the urine is imperatively needed, that the blood may be maintained at a definite and fixed density. Physiologically, it is easily conceived what irregularity and disturbance of function would everywhere ensue if the blood were continuously undergoing variations in its degree of concentration, which must occur under the varying circumstances just enumerated, if the kidneys were not, according to the vital requirements, perpetually engaged in regulating and maintaining the necessary equilibrium in the density of the circulating fluid. It is only thus that the endless variability in the specific gravity of the urine can be explained, or that we can account for the excess of saline constituents and urea at one period, and their absolute decrease with a positive augmentation of water excreted at another. If these variations be thus infinite in health, how much more irregular and ill defined may they not be in disease. An estimation, therefore, of the specific gravity of the urine leads to no practical result; the information it conveys has no absolute value, for from the density of the urine as an isolated fact, no inference or conclusion in relation to prognosis or treatment can be drawn. It is not intended by these observations to declare that the density of the urine should not be taken into the account, when we are recording *all* the qualities of the urine, physical, chemical, and morphological, with the view of describing the conditions of this fluid significant of disease. It is only asserted that the specific gravity of the urine, as an individual property, affords of itself no trustworthy information either in relation to the progress of the disease or the success of the treatment. I do not forget that a pale lemon-coloured albuminous urine of low specific gravity indicates a stage of disease very different from what is inferred from urine deep-coloured, albuminous, and of high specific gravity. But these opposite states of concentration teach less than the microscopic appearances accompanying these different densities; and it is from these microscopic appearances that in reality we obtain the information we seek.

The instrument ordinarily employed for taking the specific gravity of the urine—the urinometer—affords but the rudest approximation to the true specific gravity; where the object is only to ascertain if the urine be of *high* or *low* specific gravity, a watery urine, or a fluid highly charged with organic urinary products, this little instrument affords sufficient information: but if the true specific gravity be required with the intention of drawing conclusions from any daily alteration in the amount of solids dissolved in the urine, as for instance in a case of diabetes, when the object is to ascertain the increase or decrease in the amount of sugar present, then no reliance whatever can be placed on this instrument for any minute differences of specific weight. An accurate balance, and the thousand-grain bottle can alone be relied on. The urinometer has its index scale secured in the tube of the upper limb of the instrument with sealing-wax. This often softens, the index gets slightly displaced, and the instrument is useless. I have known such an instrument in use, and the displacement not discovered till repeated discrepancies between its results and those obtained by the balance led to a detection of the error. These instruments should never be washed in warm water; the finger should never be applied over the red spot where the index is secured; and they should be carefully kept in a cool place in the summer time. I have reason to think that the displacement of the index just mentioned was occasioned by the instrument being kept usually on a window-sill daily heated by the sun.

Lehmann has shown that the formulæ given for calculating the solid constituents of the urine from the specific gravity of this fluid are inapplicable and erroneous. "It was supposed that the residue of the urine might readily be determined from its specific gravity, and for this purpose F. Simon, Becquerel, and G. Bird, have attempted to establish formulæ from which, when the specific gravity was given, the solid residue of the urine might be determined. The complete inapplicability of such formulæ, which I have shown by my own experiments, has recently been most completely demonstrated in a large number of investigations made by Chambert on the urine of healthy persons. These experiments prove that there does not even exist any definite proportion between the quantity of salts in the urine and its density, and much less than any such connection exists between the organic matters and the density of the fluid." (Lehmann's 'Physiological Chemistry,' vol. ii. p. 436. Sydenham Soc. edition.)

If then from the specific gravity of the urine no correct estimate of the amount of the solid constituents can be obtained; if, moreover, the amount of solid constituents be a quantity infinitely variable, and dependent on many extraneous conditions unconnected with the disease, we have left but two other conditions of the urine from which information may be derived, expressive of the progress of renal degeneration. These are the proportion of albumen present, and the special character of the tubular or organic deposit thrown off from the kidneys.

The weight of albumen contained in any single specimen of urine would convey very incorrect data on which to calculate the quantity passed in the twenty-four hours. An estimate of the quantity passed in the twenty-four hours can only be obtained by collecting all the urine passed in that interval. The ordinary method is to collect and measure the whole, and by taking a part, the amount of albumen contained in that part represents the proportion contained in the whole. Such a process is totally inapplicable in private or general practice. It is next to impossible to collect all the urine of the twenty-four hours; what is passed during the action of the bowels cannot be collected: indeed, it is only in hospital practice that such observations can be attempted. For practical purposes of every day use a correct and minute estimate of the amount of albumen passed is out of the question, a rude approximation is all that can be obtained, and is all that is necessary for practical purposes, and this can be obtained readily by noting the space the coagulated albumen occupies in the tube after being allowed to rest; and the phraseology recommended by Dr. Christison expressive of the proportions observed by the eye, may with advantage be employed.

Dr. Christison's degrees of coagulability:

I. Gelatinous by heat.
II. Very strongly coagulable by heat—nearly the whole tube.
III. Strongly coagulable—half the tube.
IV. Moderately coagulable—one quarter of the tube.
V. Slightly coagulable—one eighth.
VI. Feebly coagulable—less than one eighth.
VII. Hazy by heat—no visible flakes.

A simple method of expressing approximately the apparent quantity of albumen, is to estimate the proportion which the sediment forms after boiling and settling in fractional parts of the fluid in the tube, as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{12}$.

Thus, neither from the specific gravity, nor from the amount of solid constituents, nor from the proportion of albumen present in the urine, can any definite information be collected calculated to decide the stage at which the disease has arrived, or the progress it is making.

If then from these several sources no satisfactory conclusions can be drawn, and no reliable evidence obtained that will mark the several phases of the disorder, we must turn to the microscope and inquire if the tube-casts or the cell-structure accompanying them, which appear in albuminous urine, from time to time, suffer any transformation or change sufficiently characteristic to become significant of different periods of morbus Brightii.

A comparison of the appearance of the sediment in the early stages of the disease, during or immediately after the period of hyperæmia of the organ, with what is found at the latter period of the same case after it has become protracted into a chronic disease, will convince the observer that material changes in the character of the sediment have taken place; and if it can be shown that during the intermediate period between these extremes the casts and their contents undergo a definite process of change, the inference must be that these gradual transformations will represent periods or stages, progressive or retrogressive, of the disease. A microscopic examination of the deposits in the urine would thus hold out a promise of becoming a steady guide to determine the stage at which the disease had arrived: our prognosis would then become more certain, and our treatment, adapted specially to a known period of the disease, would be directed with a fairer prospect of success. For several years past the urine of all the patients under my care in the Westminister Hospital suffering from renal dropsy, or any form, indeed, of renal disease, has been submitted almost daily to microscopic examination, and drawings made of the most characteristic appearances, and preserved in the case-books, so that a comparison of the morbid deposits of any period of the disease might be readily made, as well as with those occurring in other cases running either a similar or a varying course. The relation, if any, which exists between the various characters of these deposits, and different stages and different forms of the disease, may thus be easily ascertained.

## CHAPTER II.

### OF THE EPITHELIUM OF THE URINIFEROUS TUBES.

I do not propose to describe in detail the histological anatomy of the kidney. But it must not be forgotten that Mr. Bowman's demonstrations of the microscopic structure of these organs (Phil. Trans.), really constitute the groundwork of all that the pathologist has since accomplished in his studies of the diseases of these organs.

The origin of the renal uriniferous tubes in the Malpighian capsule, the character of the epithelium lining these channels, the relation of the vascular elements to the tubular structure, the distribution of the plexus veins formed by the efferent vessels, are the elements of an anatomical knowledge, without which pathology must have worked without result and without fruit.

All subsequent investigations have confirmed Mr. Bowman's demonstrations.

The more recent investigations of Henle into the minute structure of the kidney seemed destined to modify to a certain extent the earlier demonstrations of Mr. Bowman. Henle, by his skilful injections appeared to have discovered a double set of tubes, one in direct communication with the straight tubes of the pyramids or cones; the other constituting a convoluted series arising from the capsule of Bowman, at first following a tortuous course, then descending in the direction of the pyramids, then doubling on itself, was lost in the convolutions of the cortical part of the kidney. But Dr. Heinrich Frey,* by a more successful method of injection has, while proving the general truthfulness of Henle's demonstration, succeeded in establishing the continuity of the tortuous vessels commencing in the capsule of the glomerulus (Bowman's capsule), and tracing them running in a direct line towards the apex of the pyramids, and then curving back again towards the cortical part, they once more return and eventually by coalescence at very acute angles form the straight tubes of Bellini collected at the apex of the pyramids.

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* 'Das Mikroskop, &c.' Leipsig, 1865, p. 289, et seq.

The path followed by the urinary secretion is thus described by him—

"From the interior of the capsule of Bowman it passes into the tortuous urinary tubules. These after their meanderings, run in a straight line towards the apex of the papillæ. The tube now changes the character of its epithelial lining, and having reached a certain height in the pyramids, curves back again towards the cortical substance, forming the return limb of the loop. Sooner or later this limb (tube) is modified; becoming broader and more tortuous, in order earlier or later, with other similar tubes, to open into the common or collecting pipe, which again uniting with others at more or less acute angles, ultimately evacuates the urine at the apex of the pyramid."

It is difficult, perhaps, to realise this description without the aid of a diagram.

The illustrations to Dr. Heinrich Frey's work may be studied with advantage.

It is by these more recent investigations shewn that the character of the epithelial lining of the channels through which the urine flows differs materially in different parts. In the more tortuous and convoluted tube it performs the part of gland-cells; while in the straighter, broader and more direct tubes of the pyramids—the tubes of Bellini—it is probable simply protective. It is certain that these latter rarely give evidence even in small degree of either destruction or degeneration.

The epithelial cells of the renal tubes undergo various modifications and deviations from the standard type in the various forms of kidney disease accompanied by albuminous urine and dropsy; and it is by a comparison of these modifications at different periods in the progress of numerous cases of renal dropsy, that a fair estimate may, through the aid of the microscope, be obtained of the favorable or unfavorable progress of the disease.

It is, therefore, desirable first to refer, as a standard of comparison, to the character and appearance of the healthy epithelial gland-cell of the kidney. It is placed on what anatomists after Mr. Bowman have called the basement membrane, but more correctly by others the germinal membrane, for it is through the inherent formative power possessed by this membrane that the succession of cells is derived through life. These epithelial cells of the kidney are represented as forming a single layer, as in the intestinal canal; and not a succession of layers superimposed one upon the other, as occurs in the bronchial mucous membrane, where the inferior layers represent young cells, which, as the older ones are thrown off, become fully developed and take their places.

The individual epithelial cell of the renal tubule is polygonal in shape, and contains a nucleolus within the nucleus. The cell wall is well defined, and the contents of the cell in a healthy state appear faintly opalescent, neither opaque nor cloudy.

The epithelial cells lining the straight tubes are larger in appearance than those of the convoluted tubes, and their office probably is rather protective than glandular. They are the last to exhibit any character of degeneration, and in some forms of diseases of the kidney, while the cells at the base of the cones (pyramids) are obviously in a state of degeneration, those at the apex still preserve the character of healthy epithelium.

The epithelial cells of the uriniferous tubes never appear in the urine but under the influence of disease. The epithelium of the calyces, pelves of the kidneys, and ureters, is simply protective. These cells are more or less ovoid when isolated; they frequently are seen in groups of two or three, they then appear somewhat pyriform; they are much larger than those of the straight tubes, and they approach in character to the tesselated or pavement variety. They never appear in the urine under the ordinary circumstances of health. But in urine highly charged with uric acid, as in an attack of what is called gravel, the epithelium of these passages is shed sometimes in abundance. From the irritation of a calculus within the calyces, or imbedded in the pelvis or infundibulum of the kidney, or from any cause exciting pyelitis, these cells soon give place to exudation- and inflammation-corpuscles, and eventually to pus-cells. The epithelium of the bladder and urethra, and of the vagina in the female, is essentially protective, and consists of several layers of cells which exhibit the appearance of plates or scales with overlapping edges, and hence it is called the scaly or squamous epithelium. Individual cells, or a few cohering, forming a kind of scaly plate, are constantly seen in healthy urine—particularly in that of the female, the clusters of cells being derived principally from the vagina. In albuminous, and more particularly in purulent urine, this scaly epithelium is often present in abundance. The faint cloud which is often seen in healthy urine, and which hangs suspended in the fluid rather than is precipitated, is composed of urethral and vesical epithelium, with mucus-corpuscles more or less abundant, according to the quality of the urine. These latter corpuscles are formed in small proportion by all mucous surfaces, even in a state which cannot be considered otherwise than healthy.

In the early stage of renal disturbance accompanied by albuminous urine and dropsy, the epithelial gland structure of the renal tubes exhibits the simplest and earliest departure from the healthy or physiological type. It has apparently become somewhat larger, the nucleus is with difficulty seen, and the contents of the cell appear cloudy and granular. Here is the earliest manifestation of alteration of structure in the cell; and this alteration is accompanied by manifest embarrassment to the renal function. This alteration in the character of the renal gland-cell is in the great majority of cases preceded by evidence of grave disturbance in the equilibrium of the circulation within the organ, and proofs of blood escaping in greater or smaller quantity from the Malpighian tufts are, in the acute form of renal dropsy, I believe invariable; sometimes hæmaturia is visible and palpable to the unaided eye. In other cases it requires the microscope to reveal the presence of scattered blood discs.

Within a very short period after the stage of congestion of the organ has appeared, the epithelial cells are thrown off, sometimes as isolated cells, or aggregated in twos or threes, but in most instances united together in a tubular form, constituting the epithelial casts so familiar to the eye of the pathological microscopist. But these cells are all imperfect. This throwing off of the epithelial gland-cell oftentimes in great abundance, constituting what Dr. George Johnson has characterised as a desquamative process, and has proposed to name this form of renal disorder desquamative nephritis, arises no doubt from the cell having undergone changes incompatible with its functions as a healthy secreting cell, and it therefore is cast off as effete and useless. This degradation of the cell from the physiological type we must conceive to arise from the nutritive process regulating the development of the succeeding cells from the germinal membrane (the basement membrane of Mr. Bowman) becoming embarrassed by the blood stasis. Cell after cell, so long as the embarrassment lasts, is defective and imperfect; they rapidly break up, or are thrown off entire, and to the attentive eye will afford indices of the favorable or unfavorable progress of the disease.

Concurrent with this alteration in the character of the renal epithelial cell, is the appearance of albumen in the urine, and a dropsical effusion of more or less extent and abundance throughout the tissues, more particularly apparent on the surface of the body.

It cannot be too strongly impressed as a pathological fact of importance, that healthy epithelial cells of the renal tubes or of the bronchial mucous membrane, are never cast off. It is only when from defective development, being useless for the purpose of the tissue or organ in which they are formed, that they are shed, and appear among the products of excretion.

## CHAPTER III.

### CAUSE AND SOURCE OF THE ALBUMEN IN THE URINE.

INTIMATELY connected with the pathology of morbus Brightii, constituting as it does so important a symptom of the disease, and from its prominence constantly supplanting the name of our distinguished countryman, under the synonym of Albuminuria, is the question, whence is the albumen derived which gives to the urine its most significant character?

It is generally believed to drain through the Malpighian capillaries. It is affirmed that the serous elements of the blood percolate through these capillaries, which, in health, are supposed to furnish only the aqueous constituent of the urine. But if this were so, then the urine should contain not albumen alone, but the usual proportion of salts which make up the constituents of the serum of the blood. But this is impossible to prove, because the saline constituents of the urine of health do not materially differ, except in quantity, both relative and absolute, from those which are present in the serum of the blood.

Carbonates, sulphates, phosphates, chlorides of sodium and potassium, lime, and magnesia, in varying proportions, are present in both fluids. Some salts are found in the urine which are not present in the serum of the blood; but there are no salts in the serum which are not present in healthy urine. The chemical analysis of the urine, then, throws no light on the source from whence the albumen comes, and we still are left to conjecture, or to further investigation, to trace the channel through which so large a quantity of albumen is carried out of the system.

M. Robin has proposed a theory to explain the presence of albumen in the urine.

He considers that in health, albumen, as an excrementitious product, is decomposed in the blood by the functions of respiration; and that the nitrogenous residue of this combustion, urea and uric acid, are eliminated by the urine. Whatever, therefore, interferes with this metamorphosis of the albumen in the lungs causes its presence in the renal secretion. Thus, albumen is present in many pulmonary disorders—capillary bronchitis, phthisis, pneumonia, and certain cardiac affections.

M. Robin concludes that, when the respiratory process of combustion is too feeble to destroy the whole of the albumen which should be consumed in a given time, the general vitality is diminished; and thus, more or less albumen is allowed to pass into the urine: in fact, just so much as escapes transformation into urea and uric acid. The theory is ingenious and plausible; but it will not stand the test of clinical proof. The urine is albuminous in some cases of capillary bronchitis, in some cases of pneumonia, phthisis, and cardiac disease; even in some cases of emphysema and chronic bronchitis, but not in all. The hypothesis must fall, if (the assumed conditions being present) the proof fails even in one instance.

There are various physiological experiments and observations which, undeniably, favour the hitherto received opinion that the albumen of the urine is obtained directly from the blood. Bernard has shown that crude albumen injected into the jugular vein produces temporary albuminuria. And he further remarks that, in health, if the albumen of two or three raw eggs be swallowed, albumen will appear in the urine.

The liver is supposed to possess a powerful modifying agency on albuminous matters. Lehmann declares that 30 per cent. of albumen entering the liver by the portal vein, disappears in its passage through that organ, and cannot be found in the hepatic vein.

Dr. Parkes is inclined to the opinion that the liver plays an important part in the development of albuminuria; he thinks, through some failure in preparation, either by the stomach or the liver, albumen enters the right side of the heart, still in a crude state, and in a condition similar to that introduced into the jugular vein in Bernard's experiment.

And he very pertinently adds, "many cases," I am inclined to say all, "appear to be of blood origin, and among the many common antecedents of Bright's disease are circumstances of diet and mode of life impairing the processes of the stomach and liver. In how many cases," he asks, "although no liver disease was suspected during life, do we find the structure of this organ seriously diseased? In the history of Bright's disease there are many reasons for believing that the nutrition of the tissues is early and deeply affected."

No albumen is ever present in the urine, or indeed in any excretions from epithelial mucous membrane in the healthy or physiological state of the organs. The physiological chemist affirms that its presence indicates either disease of an excretory organ, or a morbid alteration in the composition of the blood (Lehmann, vol. i. p. 344), and clinical observations prove this. The presence of albumen in the urine, however, arises from many pathological causes, and it is no longer regarded as pathognomonic of only one form of disease. The diseases, however, in which albumen is temporarily present in the urine, are all of the type of what may be called blood diseases, and in which the integrity of the capillary circulation is manifestly disturbed. These comprise the various forms of fever, typhoid, typhus, small-pox, scarlet fever, diphtheria measles, erysipelas, acute rheumatism, pneumonia, and some others. It must be remarked, however, that albuminous urine is not always present in these cases, although it has been often observed. Albumen is also present in the urine whenever there is a mechanical impediment to the free return of blood from the kidneys through the renal veins into the cava, as in emphysema, chronic bronchitis, phthisis, and heart disease. It is found also occasionally in pregnancy, and disappears after the pressure of the gravid uterus on the abdominal viscera has released and set free the renal circulation.

In the above disorders its presence is temporary. In the several forms of organic disease of the kidneys, in acute and chronic morbus Brightii, it is a permanent symptom. In calculous disease of the kidneys, in tubercle as well as in cancer of these organs, it is also present, but it is then derived from the pus or blood which accompanies those diseases. It becomes a question of great interest to be decided, how or whence is the albumen in the urine derived. The fluids poured forth from all epithelial mucous surfaces in a state of disorder are albuminous. The mucus of a common catarrh, the abundant secretion in bronchorrhea, and in capillary bronchitis, is not only albuminous, but accompanied by an infinity of abortive epithelial cells. The fluid of ordinary intestinal diarrhœa, as well as the aqueous rice water discharge of cholera, are albuminous and is also accompanied by entire patches of cylindrical epithelium. (Lehmann, 'Phys. Chem.,' Sydenh. Soc. ed., vol. i, p. 345.)

It would seem then, a pathological law common to all epithelial tissues, that whatever disturbs the equilibrum of nutrition in them, the physiological balance, as it were, leads to not only a permeation of the albuminous elements of the blood, but a profuse and destructive shedding of the cells constituting the epithelial layer. Lehmann gives the following explanation of the manner in which albumen escapes from the kidneys. There are two sources from which it may be derived. 1st. Either the blood has already become so hydræmic that the serum of the blood not merely transudes through the capillaries of the peritoneum, of the subcutaneous cellular tissues, and of other organs, but also the kidneys themselves, and that consequently some albumen is thus added to the substances which are ordinarily separated by the kidneys: or 2ndly, we may assume that those organic diseases of the thoracic or abdominal organs, which occasion a stasis of the circulation in the capillaries and veins of the abdomen, and thus give rise to copious transudations, also set up a similar condition in the capillaries and veins of the kidneys, by which an effusion of albumen into the urinary canals is induced. He then cites some experiments on rabbits where a ligature of the renal vein of one side, or of the inferior cava, by the increased hydrostatic pressure of the blood in the renal capillaries was always followed by albumen in the urine. It was further found that ligature of the renal vein of one side produced albumen only in the water of the side operated on. (Lehmann, 'Phys. Chem.,' vol. ii, p, 423; see also 'Medico-Chir. Trans.,' vol. xxvi, p. 51.)

These experiments clearly prove that obstructed circulation, or blood stasis, is a competent cause for the presence of albumen in the urine, and it may also be admitted that a blood deficient in corpuscles and fibrine, poor and watery, may easily percolate or transude through the capillaries of the kidneys and produce a like effect. But in both these examples, the explanation offers no more than a mechanical filtration, and it has appeared to me that this will not satisfactorily explain, or account for the presence of albumen in the urine in those chronic cases, in which, for months, nay, for years, this material continues present in the urine, and in which all trace of disease has disappeared, except that most significant one, the albumen in the urine. I think a mechanical filtration is not sufficient to explain these examples. It appears to me more consistent with the recent researches of pathologists, to conceive that this exceptional excretory product in these chronic cases of albuminuria, may result from the agency of the renal epithelial cells as perverted in their function, as they are impaired in their growth. The earliest intimation of perverted function in all epithelial structures, is the presence of a fluid product (mucus) entirely absent in a state of health. This fluid whether nasal, catarral, bronchial, gastric, intestinal, urethral, or vesical, is uniformly albuminous, and accompanied by an infinite number of abortive or imperfect cells. In an older phraseology, this flux, simply called mucus, was said to transude through or from the membrane in a manner no one ever sought to explain. It was supposed that under certain disturbing influences of the capillary circulation of a part certain materials were transuded, but how or whence no further inquiry was made. The brilliant researches of Virchow have afforded a clearer view of these processes, and it is now conceived that the operation of a disturbing cause is manifested by the cellular elements of the texture attracting or having an affinity for certain derivatives from the blood, and pouring them forth in conjunction with the abortive or immature cells caused by the disturbance.

This view would place the albumen rather in the light of a secretion than of a simple act of transudation or permeation. I would venture to suggest then, that the albumen is largely derived from the affinity of imperfect and immature cells for the serous or albuminous element of the blood, and perhaps, also, from the rapid breaking up and disintegration of these abortive cells which are generated in the place of the true vigorous gland-cell, whose office it is to secrete only the constituents of healthy urine. From this point of view the albumen would be regarded then in the light of a secretion.

Can any proof be adduced in favour of this opinion? Analogy is not proof, but analogy, I think, justifies it. It is well known that in pneumonia all the chloride of sodium which should appear in the urine, disappears from that excretion, and makes its appearance in the sputa from the pulmonary-cells. Can we, for a moment, suppose that this chloride is a simple filtration of the salt from the blood through the walls of the capillaries in the air-cells? What determines its presence here, rather than in any other tissue, but that the cells attract this chloride as essential to their development? The chloride is absent from the urine, and present in the sputa only so long as these imperfect cells are forming. Its absence from the urine marks the period of hepatization, and as liquefaction of the exuded product goes on, and the rusty sputa slowly gives way to a free, purulent, and eventually a muco-purulent expectoration, the chloride disappears from the pulmonary exudation, and reappears in the urine.

But what exercises this force of attraction? Not simply the condition of the inflammatory process; for if so, inflammatory tissues generally should attract the chlorides, and in every form of inflammation they should be absent from the urine.

The sputa of pneumonic inflammation are derived from the fibro-serous coat of the air-cavity, the cells of which, while attracting and forming the fibrinous and croupous material possess apparently a special affinity for the chlorides.

It is an attraction essential, perhaps, to the development of the abortive cells which accompany the fibrinous and croupous exudation, and continues until ulterior changes in the character of the excreted matters have become perfected.

Again, in gouty inflammation, we know, from the researches of Dr. Garrod, that the essence of the inflammatory process is a deposit in the cartilaginous, ligamentous, tendinous, and osseous tissues of uric acid, and its soda base.

Here, again, there cannot be simple transudation of the urate through the walls of the capillary blood-vessels.

For cartilage is non-vascular: the blood, however, has been proved to contain uric acid in excess in gout. How, then, can it find its way to the non-vascular cartilaginous tissue, except by a special or peculiar affinity which the cartilage-cell exercises for the excrementitious matter when it accumulates, or is not freely carried off by the kidneys.

We daily recognise, and can, during life, satisfactorily demonstrate this affinity of cartilage-cells for uric acid and its soda base. The cartilages of the ear, in gouty habits, are the well-known seat of these uric acid deposits. Dr. Garrod was, I believe, the first to point out this pathological fact, and use it as a test of distinction between true gout and rheumatism. It may at all times be applied to any individual in whom there lurks the gouty habit. Thus the morbid matter of gout, the uric acid, is not deposited, hap-hazard, here or there; but only in certain well-defined tissues, and these appear to be the cells of cartilage, ligament, tendon, and bone, which seem to be endowed with an elective or selective power; and attract to themselves this material, which remains persistently in the cells of the tissue in which it is deposited.

Again, why in acute rheumatic fever is there so marked a disposition to the accumulation of the fibrinous elements of the blood on the valves of the heart as well as on the exocardial membrane, but that the cellular elements of these tissues exercise a certain attractive force by which fibrine is drawn from the blood? The cellular elements of the serous surface, as Virchow has shown, take up this excess of fibrine; the process, therefore, is not a simple filtration or mechanical transudation of the fibrine, as was once conceived, but an example of perverted cell nutrition.

Moreover, it appears to be difficult to understand how ulterior changes could take place in the material deposited on the valves of the heart, if, as I shall hereafter endeavour to show, it was a simple filtrate of fibrine, uaccompanied by any cellular elements. How could it as pure fibrine, such as we recognise it when obtained direct from the blood by whipping, undergo either purulent, fatty, or earthy degeneration, except through the agency of cells?

Again, in regard to the phenomena of some blood-poisons, for instance, syphilis, why should certain structures be specially affected, as others are exempt from the secondary effects of this disease? Why are the iris, the periosteal and osseous structures, the skin, and certain portions of the epithelial membranes, the chief seats of its manifestations, but that the cellular elements of those parts exercise a species of affinity or selection for certain morbific agents? Again, why in jaundice should there be that remarkable difference between the colour of the conjunctiva and the skin, and the internal parts of the mouth; the intense orange tinge of the two former contrasting so strangely with the red natural-looking colour of the inside of the lips, cheek, and tongue; but that the cells of the orange-stained tissues possess an elective or selective power for the pigmentary element of the bile retained in the blood not possessed by the epithelial cells of the alimentary canal. Moreover, in this disorder the renal epithelial cell appears to possess this selective power to a great degree, hence so large a portion of the bile-pigment in jaundice finds its outlet through the kidneys.

I must therefore, venture to express my conviction that if, as we may reasonably suppose, the chlorides in pneumonia are excreted through the agency of the cellular elements thrown off in the sputa,—if the uric acid compounds in gout find their way from the blood through the agency and affinity of cartilage and other cells; if in the so-called inflammatory process of serous surfaces the fibrinous element of the blood is fixed in those tissues as an exudation chiefly through the agency of cellular affinity; if in jaundice only certain cells take up the retained bile pigment, so I would conclude that the albuminous matter, so persistently and continuously excreted in chronic morbus Brightii (albuminuria) is derived, not by a simple filtration from the blood-vessels, but by the affinity or demand for the albumen of the blood by the continuous formation of imperfect or abortive cells, which either secrete it or produce it by their disintegration or breaking up.

Analogy is not proof; and thus far, it is only sought to show by analogy what happens in other tissues and in other diseases.

It will be asked, can any direct observation or experiment be brought forward to justify the opinion that the albumen in morbus Brightii is derived from the breaking up of the abortive cellular elements of the uriniferous tubes?

It is a well-known pathological fact, that the contents of all cells are albuminous. The contents of the pus-cell are albuminous; the contents of the mucous or abortive epithelial cell are albuminous.

Dr. William Addison, whose contributions to the doctrines of cellular pathology are well known in his work on 'Healthy and Diseased Structure,' says, "when blood- or pus-cells are ruptured by liquor potassæ, the resulting material is a viscous matter, apparently identical in all essential respects with lymph or mucus, capable of forming fibres; sometimes spontaneously, and always upon the application of re-agents, leaving an albuminous material in solution.

The pus-cell is admitted to be derived as a transitional form from other cellular elements, and especially from epithelial elements.

Now, if we take a number of pus-cells and act upon the cell-wall by liquor potassæ, the wall is dissolved, and the contents of the cell set free. If the viscid magma thus formed be acidulated with nitric acid to neutralise the potash, which holds the albumen in solution, upon the application of heat, or any of the known re-agents for albumen, the presence of that substance in great abundance may be demonstrated.

The inference I venture to draw from this experiment is, that the breaking up of the cell-wall by liquor potassæ has liberated the albuminous contents of the cells, while the microscope testifies to the disruption of the other elements of the tissue.

There is yet one other subject of interest connected with the long continuance of albumen in the urine, associated as it universally is with a diminution of the urea, the leading characteristic of healthy urine. Can it be said in these cases that the albumen is the pathological substitute for urea?

Several chemists have asserted that albumen can be converted into urea by the influence of certain oxidizing agents.

Bèchamp obtained urea by the action of permanganate of potash on albumen.

Dr. Lionel Beale states* that he has not been able to confirm these observations. On the other hand, Dr. Thudichum distinctly states† that when albumen is digested with permanganate of potash, urea is the result of the oxidation.

The chemical evidence is thus far contradictory; but the fact cannot have escaped notice, that cases frequently occur in which the urine continues for months, and even years, persistently albuminous. I know two cases of near four years' duration, the patients' health being fairly re-established, all the chief functions being performed with undeviating regularity, and with no obvious disorder, except in the composition of the urine. The character of this being the presence of albumen, with diminution of urea. Although we are as yet without proof, yet it has appeared to me probable that the albumen in the urine (in these long standing cases) must, in some way, take the place of the urea, and become, as it were, its pathological substitute.

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* 'On the Urine,' p. 88. † 'On the Pathology of the Urine,' p. 249.

The organic chemists are very skilful in conjugating the elements of organic substances; or, in other words, transposing the elements of organic substances with the addition of an atom or two of oxygen, or an atom or two of the elements of water, of carbonic acid, or other proximate principles, and thus explaining the metamorphosis which a particular substance undergoes in the process of change. But there is, at present, no generally accepted formula for albumen, and, therefore, we cannot theoretically explain the probable conversion of albumen into urea by an oxidizing agent.

In cases of temporary albuminuria, either dependent on impediment to the free circulation of blood through the lungs, as in emphysema, chronic bronchitis, pneumonia, &c., or in some forms of heart disease, or from the pressure of the gravid uterus, or in the experiments previously cited of compressing the inferior cava, or tying the emulgent vein, it is more easy to conceive that the albumen in the urine is the result of mechanical transudation or permeation of the serous elements of the blood, from engorgement or obstructed flow of blood through the kidneys, than as derived from abortive or imperfect gland cells, and its origin may be traced, probably, solely to the mechanical impediment to the circulation through the kidneys.

It must be remembered, however, that though the albumen in the urine ceases as soon as the regular current of the blood through the renal organs is restored, yet this temporary embarrassment of the circulation may, and often does, if it be prolonged beyond a moderate period, affect the character of the renal gland-cells; for when the circulation through an organ is in any degree obstructed, provided the obstruction be something more than momentary, the function, the secretion, the nutrition, and consequently the subsequent development of the gland-cells, is proportionately disturbed.

This is illustrated by what is observed in cases of cardiac and pulmonary dropsy, particularly when associated with emphysema. The urine at first is non-albuminous; as the dropsical tension increases, and the obstruction in the cava reaches a maximum, albumen shows itself. The sediment at this stage usually exhibits coarse granular casts, without any cellular elements. Here the albumen is traceable to simple stasis from obstructed circulation through the inferior cava. If the dropsical tension is relieved, the albumen decreases, and may disappear altogether. But there are cases where no such relief is obtained; the urine continues albuminous, and the sediment after a very moderate period, exhibits unequivocal proof of the defective conditions of cell formation which even follows a prolonged embarrassment to the circulation through the kidneys.

## CHAPTER IV.

### THE MICROSCOPIC OBJECTS IN ALBUMINOUS URINE.

The earliest record of the tube-casts in albuminous urine, appeared in the year 1843. Figures of them occur in several German works about that period; but the diagnostic value of the different varieties of these tube-casts and their cell-contents was not then understood. Dr. George Johnson has done much towards placing these tube-casts in their proper position in relation to some forms of kidney disease; but I am desirous of showing that a still higher diagnostic value belongs to them than they have hitherto been supposed to possess, and I think if attention be paid to certain special characters belonging to them, at different periods of the disease, that inferences of great practical value may be drawn from the progressive changes the cells undergo. The following illustrations and cases are so arranged that the characters of the simpler and earliest forms of deposit are first described, proceeding thence to the more advanced stages of renal degeneration, and comparing the appearances presented as the disease advances. But I would here guard the reader and practitioner from the error of supposing that one single examination suffices to determine the stage of the disorder; in some cases this may be sufficient. It is, however, rather by comparing the character of the deposit of one period with another, and by carefully noting the altered appearance of the casts and cells, and the direction of whatever change is taking place, by which a correct estimate is formed of the advance of the disease.

The figures which illustrate the following pages will be familiar to all readers of the more recent works on the pathology of the kidney. It is not presumed that any novelty attaches to them. What the author seeks is to illustrate the several stages of renal degeneration, by portraying the appearance of the renal cells and casts at intervals during the progress of the disorder, believing that by this mode of illustration the student in this branch of clinical observation will be relieved from the embarrassment which has hitherto beset him when he seeks to know what meaning or inference he is to draw from the several varieties of casts and cells which he meets with in the urine. The figures hitherto published to illustrate the deposit in Bright's disease are grouped together in one plate, and, with the exception of Dr. George Johnson's and Dr. Gairdner's works, no reference whatever is made to the stage of the disease at which the several varieties may be expected to appear. I venture to hope that the following illustrations may not be without their value, both to the student and the practitioner.

The sediment found in albuminous urine consists principally of certain cylindrical forms moulded in the uriniferous tubes of the kidney; these present different characters according to the stage of the disease, or the intensity of the morbid process. They may be either coarsely granular, finely granular, or partly granular and transparent, or completely hyaline. Associated with these casts are various cell-structures—the blood-cell, the epithelial cell, healthy or abortive; the compound granule-cell; and the various modifications which cell-growth undergoes during the progress of acute or chronic disease. When hæmorrhage takes place into the uriniferous tubes from the rupture of the Malpighian capillaries, the coagulum formed is washed away and appears in the urine as a cylindrical cast of a granular appearance, entangling a number of blood-cells within its mould. These casts are usually stained of a red colour by the hæmatin of the effused blood. As the hæmorrhagic state subsides epithelial cells appear in the cast, mixed with blood-corpuscles; these latter become less numerous and ultimately disappear. The casts gradually lose their fibrinous, or, properly speaking, their coarsely granular appearance, and the epithelial cells then seem imbedded or rather held together by a fine granular exudation. In favorable cases the casts become daily more transparent and the epithelial cells less abundant. In other cases various modifications of cell-development take place; resplendent granules, free nuclei, accompany the cast; compound granule-cells, abortive epithelial cells, disintegrated granule-cells, in the shape of grape-like clusters of nuclei, and other evidence of cell-transformation, make their appearance and supply information of the nature and direction of the renal disease.

The following objects are from time to time met with in albuminous urine:

Fibrinous casts, containing blood-discs (blood-casts). (Pl. 1, fig. 1.)

Granular casts, containing epithelial cells and blood-discs. (Pl. 1, fig. 2.)

Finely granular casts, containing epithelial cells, either natural or undergoing transformation. (Pl. 2, fig. 2.)

Finely granular casts, containing compound granule cells and free nuclei, and occasionally pus-cells. (Pl. 1, fig. 4, and Pl. 4, fig. 2.)

Pus-casts,—casts composed exclusively of pus-cells are very rare; but casts containing cells with reniform or trefoiled nuclei are occasionally seen. (Pl. 4, fig. 11.)

Hyaline casts, containing epithelial cells, either natural or in a state of change. (Pl. 1, fig. 12.)

Hyaline casts, containing resplendent granules, free nuclei, and here and there an epithelial cell. (Pl. 3, fig. 4.)

Hyaline casts, containing compound granule-cells, free nuclei, and disintegrated cells. (Pl. 5, figs. 4, 5.)

Hyaline casts containing large fat-granules, and grape-like clusters of nuclei, having an oily appearance. (Pl. 6, figs. 2, 4.)

Waxy or cloudy casts, without admixture or structure of any kind. (Pl. 4, fig. 12.)

Epithelial cells, isolated or in groups, from the uriniferous tubes, the pelvis of the kidney, ureters, bladder, urethra, or vagina.

Amorphous flakes of a granular material, stained of an orange-red by the hæmatin, sometimes entangling blood-discs, more frequently without. (Pl. 1, figs. 7, 8.)

Blood-corpuscles, always single, never in rouleaux.

Pus-cells, isolated or massed together in groups.

Compound granule-cells, isolated resplendent granules (free nuclei).

Botryoidal clusters of granules, or nuclei (disintegrated compound cells,) and diffuse granular matter.

Crystals of uric acid, rhomboidal or lozenge-shaped, occasionally columnar, sometimes amorphous (grit).

Crystals of oxalate of lime (octohedra). Dumb bells, or irregularly crystallized.

Crystals of the triple phosphate.

Vibriones.

Spermatozoa.

Sporules of Penicilium glaucum, rapidly developed in all albuminous fluids, according to temperature or time of year.

# CHAPTER V.

## METAMORPHOSIS OF CELL-STRUCTURE AND ITS PATHOLOGICAL SIGNIFICATION.—ORIGIN AND NATURE OF THE TUBE CASTS.

But little attention has hitherto been paid to the *progressive* alteration of cell-structure which accompanies the casts in albuminous urine. With the exception of the so-called epithelial casts, and the fatty and oily and waxy casts, but little notice has been given to the various modification of cells which are thrown off as exudations from the uriniferous tubes; and no effort has been made to extract any information, as the disease advances from those transformations of the cells which are present to the eye in morbid urine. Those who adopt Dr. George Johnson's nomenclature have hitherto been content to interpret the presence of cells in the casts as significant of an acute or chronic process of desquamation, or of fatty degeneration, but no special value has hitherto been accorded to the transformation and change which the cells themselves exhibit during the lifetime of the patient.

Dr. George Johnson communicated to the Royal Medical and Chirurgical Society a paper on the Pathology of Bright's Disease of the Kidney, which was published in the 'Transactions' of 1846, in which he successfully showed that in one form of that disease, the epithelial cells of the kidney underwent a fatty degeneration, and that "the disease was primarily and essentially an exaggeration of the fatty matter which exists naturally in small quantities in the epithelial cells of the healthy organ." He pointed out also the diagnostic value of a microscopic examination of the urine, and that the presence of renal disease might be inferred from the character of the epithelial cells seen in the sediment of albuminous urine.

These researches have done good service to the cause of renal pathology, and they have been the means of directing the investigations of others into the proper paths of observation. I desire to amplify these views, to travel onward by this road,—to extend to a wider sphere this plan of research; and if my conclusions are not always in accordance with his, I nevertheless acknowledge the benefit I have derived from his observations; his facts remain uncontradicted, interpret them as we may.

I propose briefly to notice the origin and nature of these tube-casts. The granular and hyaline casts are strictly analogous to what is formed by other epithelial surfaces having the character of mucous membranes, and further investigation into this subject convinced me that in their nature all the various forms of casts differ but little, except in their tubular form or appearance, from what is thrown off from the bronchial mucous membrane under the influence of irritation or the so-called inflammatory causes. I have traced these excretory matters in all the commoner forms of pulmonary disorder; and I have traced from the ordinary sputa of simple catarrh, through the various grades of bronchitis—especially in that somewhat unusual form, the tubular or plastic bronchitis, as well as capillary bronchitis—in pneumonia, both in the mild and severe forms, even in phthisis, types of nearly all the forms of casts found in renal dropsy.

Plates XIII and XIV represent these various forms of sputa. In fig. 1 is portrayed the hyaline appearance of the sputa, containing a few large spherical cells (mucous corpuscles), with one large granule-cell—often called a pigment cell, from its being in many cases deeply coloured greyish or black, particularly in the sputa of those living in large towns.

These sputa are the type of the hyaline casts seen in atrophying kidneys, in the gouty kidney, and in the last and more favorable stage of the curable cases of renal dropsy. In these latter cases, as I have elsewhere remarked, it signifies a simple catarrhal state of the renal tubes. That is a state in which but few abortive or imperfect cells are formed, and consequently but few cast off. In all forms of gouty kidneys these hyaline casts are present, and they signify a like catarrhal condition of the renal tubes. It must be recollected that their presence by no means signifies an atrophy or shrinking of the kidneys, although they are commonly present in most instances of gouty kidney. The atrophic process depends on conditions altogether different from those present in morbus Brightii. This state of the gouty kidney will be described more fully hereafter.

The representation of the sputa in ordinary bronchitis does not differ from those which are seen in the bronchitis of those suffering from renal dropsy. In these sputa we find all the cell-elements found in the sediment of the severer forms of albuminuria. Plate XI, fig. 3, affords a proof that the bronchial mucous membrane gives cell products differing only in the absence of a tubular arrangement or grouping, but identical in other respects with what can be seen in any chronic case of morbus Brightii other than in the stage of congestion. But the sputa in plastic and capillary bronchitis often present appearances more strictly typical of the casts of the renal tubes. These are very analogous to the fibrinous casts of second stage of acute morbus Brightii (Plate XIII, fig. 2), and the type of the granular epithelial cast is more distinctly obvious in the sputa of capillary bronchitis. (Plate XIII, fig. 3.)

The sputa in pneumonia possess many features in common with the casts of the inflammatory or acute stage of morbus Brightii.

The blood-casts, or as they are sometimes called fibrinous blood-casts, always present in the early stage of the dropsy after scarlet fever, have their analogy in the rust-coloured or more deeply stained sputa of pneumonia.

Plate XIV represents the sputa in various stages and degrees of severity in pneumonia.

Figs. 4 and 5 are representations of the rust-coloured and blood-stained sputa in severe cases. The cellular elements present are identical with those seen in the casts in the urine in the stage of hæmaturia after scarlet fever, and the stage of engorgement of the kidneys in the early stage of acute morbus Brightii. In the milder forms of pneumonia, where the expectoration is but slightly tinged (figs. 1, 2, 3), scarcely deeper than a Sienna orange colour, blood-discs are not frequently visible; but large cells, similar to the so-called pigment-cells of ordinary bronchial catarrh, and which give to the sputa that steel-grey colour so familiar to all, appear to be the cells which have most affinity for the colouring matter derived from the hæmatin; for these cells, in the mild forms of pulmonary inflammation, are alone coloured. It will be seen that the deeper colour, in the rust-coloured and blood-coloured sputa, is due to the increased number of blood-corpuscles, and the proportional increase in the hematin tinging all the cells except those derived from the mouth and cheeks. Three cells of squamous epithelium in the corner of the figures remain uncoloured.

Fig. 6 is the expectoration of the stage of liquefaction of the croupous product, and consists of an abundance of mucus- and pus-cells. These forms find their analogue in those casts of the renal tubes which appear in the sequel to the acute stage of cases of morbus Brightii, which present the indications of becoming curable. This form of sediment is represented (Plate VIII, figs. 13, 14, 15), and cells similar in all respects to those which the terminal period of pneumonia exhibits, are constantly present.

Lastly, in phthisis the expectoration displays all the characteristic cell and fatty aggregations which appear in the urinary sediment in cases of extreme fatty or amyloid degeneration of the kidneys, forms of renal disease often associated with phthisis and cancer. If the figures representing the urinary deposit in a case of phthisis (Plate VII, figs. 1, 2, 3), as well as the figs. 1 and 2, Plate VIII, be compared with the fig. 4, Plate XIII (Sputa phthisis), the identity of the cellular elements will become conclusively apparent.

I think, then, it cannot be denied by those who are familiar with the microscopic appearances of the sputa in the different forms of pulmonary disorder, that varieties of abortive, deteriorated, and depraved epithelial cell growth present in these excreta are strongly typical of those which are seen in the renal casts, the only distinction being in the apparently tubular form of the one, and the more diffluent aspect of the other. Yet I have occasionally, and after some patient research, found, especially in chronic phthisis, and once in capillary bronchitis, casts in all respects, except in size, identical with renal casts. In pulmonary diseases these excretory matters are derived from the metamorphosis of the epithelial elements of the bronchial mucous membrane. Can we hesitate to adopt the proposition that strictly analogous appearances occurring in the renal tubes are also derived from the metamorphosis of the abortive epithelial elements of the renal tubes? If this view be accepted, there is no longer any difficulty in understanding the nature and source of the renal casts. Proportioned to the intensity and character of the disturbing or irritating cause, we observe either—

I. Fibrinous blood-casts corresponding to what is seen in pneumonia.
II. Epithelial granular casts corresponding to what is seen in bronchitis.
III. Epithelial and purulent and granular casts, corresponding to the cellular elements in acute bronchitis and the stage of resolution in pneumonia; hyaline or transparent casts, as in simple catarrh; fatty casts, as seen in phthisis.

The fibrinous blood-casts are clearly derived from a hæmorrhage into renal tubes, and they evidently consist of blood-globules and fibrinous matter coagulated in the tubes; and the rust-coloured sputa of pneumonia is similarly formed. The granular epithelial casts consist of epithelial cells, more granular than the healthy granular epithelial cell; in fact the cell in the earliest state of depraved metamorphosis. Many of these abortive cells break up and disintegrate, perhaps as soon as formed, and their granular or mucin-like contents, entangling therein cells which are swept away by the fluids from behind, present to the eye the appearance of epithelial cells held together by a fine granular material. The same conditions are apparent in the viscid sputa of bronchitis, and especially in bronchial catarrh.

The pus-cast is identical with what is seen in pneumonia and in capillary bronchitis. The epithelial cell, instead of being simply abortive, cloudy, and granular, has degenerated into the more rapidly growing pus-cell. This is also washed away by the current from behind, and so long as the pus or mucus is derived from the epithelial element only of the renal tubes it preserves this tubular appearance. But if, as in cases of scrofulous or calculous pyelitis, the pus is derived from the cellular elements of the interstitial tissue, then the pus is no longer held together in tubular-formed casts, but becomes freely diffused through the urine as fluid pus, a condition analogous to what is seen in tubercular ulceration of the lungs. The fatty casts represent the most advanced state of degeneration. The cells contain large aggregations of fatty nuclei. Sometimes the cells are large compound cells, with numerous highly resplendent nuclei; accompanying these are fatty granules, varying in size, sometimes aggregrated together, sometimes free.

These appearances are familiar to us as occurring most frequently in cases of phthisis, where there is albuminous urine, and where the kidneys are eventually found with the characters of the waxy or spermaceti-like (lardaceous or amyloid) degeneration.

The hyaline or transparent cast, so identical in appearance with what comes from mucous membranes under the simplest form of irritation, as in ordinary bronchial catarrh, represents I believe the terminal period of the equally milder forms of renal disturbance, as well as the more severe ones of atrophy. In all those curable cases of albuminuria which follow scarlet fever, so soon as the renal engorgement with its fibrinous blood-casts has given place to the epithelial granular casts, they in their turn, slowly and *pari passu*, with the diminution, and even disappearance of the albumen from the urine, are followed by these hyaline or transparent casts, and represent, I think, a state of the tubes analogous to ordinary catarrh, that is, mucous cells (uninuclear) are formed, which quickly disintegrate and break up; and this disintegration produces the colourless mucin-like material, transparent and glassy, with here and there a resplendent granule, the abortive nucleus of one of these defective cells. (Plate III, fig. 1.)

The hyaline-casts, even the most delicate and transparent, always contain, or are accompanied by resplendent nuclei; the nuclei doubtless of the disintegrated cells.

These hyaline-casts are very frequent in cases of gouty kidney, especially where the amount of albumen is not large. In the more serious forms of albuminuria their presence always marks a period of comparative improvement and diminution of the dropsy; and a return to the formation of cells more adapted to perform the function of excreting the usual urinary constituents.

Again, as a general rule, those cases eventually do best in which either the so-called pus cells, or even pus-casts, that is, cells with a trefoiled or reniform nucleus, are mixed up with, or take the place of the epithelial casts; for these pus-cells, or mucus-cells, really represent a safer direction for cell development to take than the highly fatty, or highly granular, or the compound granule-cells, which are the types of the more intractable forms of renal degeneration.

I have, therefore, no hesitation in expressing my conviction that these casts are derived from the metamorphosis or breaking up of the epithelial cells of the renal tubes, excepting in the case of the fibrinous blood-casts which appears to be formed by the coagulation of the fibrine entangling blood-corpuscles within it, and is therefore formed directly by hæmorrhage. In all other forms of the so-called tube casts, they are derived from the metamorphosis of cells in various stages of degeneration and decay; for it must be recollected that all these casts contain evidence of broken up cell structure.

In the various forms of morbus Brightii the cell-structure of the kidney undergoes different kinds and degrees of transformation and change.

Modified by circumstances which will be more fully developed hereafter, the cell-structure of the renal tubes appears to depart from the standard or healthy type in very different degrees, and in this respect to exhibit a remarkable analogy to what takes place in other organs having epithelial structures.

It has been shewn when mucous surfaces or canals are the seat of diseased action, not only is the standard or healthy epithelium shed, but it is accompanied by cells in various stages of development, which may severally be regarded as examples of imperfect or abortive formation; and this tendency to degenerate is proportioned to the deterioration of the vital energies of the organism. These conditions are seen exemplified in catarrhal and inflammatory exudations of the air-passages. On this subject Lebert's 'Physiologie Pathologique' may be consulted with advantage. The epithelium of the kidneys under the influence of disease exhibits very analogous conditions.

This metamorphosis of the epithelium of the tubes I believe to be pregnant with most valuable information if rightly interpreted, and presents a prospect of estimating, with some degree of accuracy, the rapidity, force, and direction of the morbid process going forward in the kidney. I think attention to the character and modification of the cell, of equal, if not more importance than the granular or hyaline appearance of the cast.

The first departure from the healthy type of the epithelial cell is its becoming more granular, the nucleus being either obscured or accompanied by granular matter. Other cells are seen filled with highly resplendent granules; these granular cells were formerly called Gluge's inflammatory corpuscles, from the opinion prevalent that the presence of these granule-cells was a proof of inflammatory action. These cells, however, are usually very abundant in all catarrhal affections of epithelial surfaces, and may be most readily seen in the ordinary mucous discharges of bronchial or nasal catarrh.

Some observers are disposed to consider that these granule-cells arise from the fatty degeneration of pus-cells; but a careful examination of the mucous fluid in the mildest forms of catarrh where no pus-cells have pre-existed, will, I think, prove that one of the earliest manifestations of a hyperæmic condition of a mucous surface, accompanied by a casting off of epithelial cells, is the metamorphosis of some cells and their departure from the normal type, and their tendency to become abortive, or what appears to constitute a fatty degeneration.

This transformation of the epithelial cell into the granule-cell has been observed by Reinhardt (Wedl's 'Pathological Histology,' Syd. Soc. edit., p. 292), in various conditions of the pulmonary mucous surface. Wedl does not consider Reinhardt's proposition, that granule-masses are abortive, or degenerated, or altered epithelial cells, is of universal application; but he admits that a perfectly analogous condition occurs in the kidney in 'morbus Brightii,' and he recognises the fatty degeneration of the epithelial cells as a well-known morbid phenomenon in this disease, although he does not consider it a universally established fact.

Without seeking to decide this point, I feel convinced that a careful examination of the alteration in development which the epithelial cells in albuminous urine *progressively* exhibit, will be found to afford valuable assistance in the prognosis of renal disease. It must, however, be recollected, that it is not the presence of one or two granule-cells among healthy cells that would justify the opinion of an unfavorable progress. It is the constant and continuous increase of cells becoming more and more degenerated and compound, with a proportionate decrease of true epithelium, which is the index of advancing disease.

The pathological import of these granule-cells has, by different observers, been variously estimated. They are now generally considered as abortive epithelial cells, and they may be seen in all disordered conditions of mucous membrane (Plate I, figs. 5, 12; Plate III, figs. 2, 3, 4; Plate XI, fig. 3; Plate XIV, figs. 2, 3, 4); they rapidly break up, and the remains of them, in the form of isolated resplendent grains, or grouped together in clusters, grape-like or mulberry-like, without any cell-wall, are constant objects in the field of the microscope.

Virchow says of these granule cells *or* inflammatory corpuscle, "A cell never remains, for any length of time, in the state of a granule cell; but as soon as it has entered into this stage, the nucleus generally disappears at once, and ultimately the membrane also; probably by a species of solution. Then we have the simple granule globule, or, as it was formerly called, inflammatory globule (exudation corpuscle), which Gluge first described under this name. Gluge here made a mistake, common to early stages of microscopy. He saw, when examining a kidney, bodies of this sort in the interior of a canal, which he took for a blood-vessel. This happening at a time when the doctrine of blood stasis was most in vogue, he imagined he had before him a vessel with stagnating inflammatory globules. Unfortunately the blood-vessel was a uriniferous tubule; what he termed inflammatory globules are degenerated renal epithelium."*

The presence then of these granular globules is to be regarded as the earliest manifestation of degeneration, when the cell no longer retains its existence as a gland-cell, and so far as the renal structures are involved, implies a state of blood stasis or embarrassed circulation, and consequently defective development of cell structure, and proportionate to the number or amount of the fatty or granular debris accompanying them may we infer the progress of the renal disorder. Thus, an examination of the sediment in albuminous urine at certain intervals will exhibit this transformation, either advancing or receding, and an estimate may accordingly be made with some degree of certainty of the state of the kidney during life. A reference to the following cases will illustrate this opinion. In Hancock's and Welch's and Staunton's cases (Plate V), the epithelial cells throughout preserve their standard type; a few granule-cells make their appearance as in all catarrhal exudations, but they are always accompanied by healthy epithelium. In Osborn's and Eden's cases, the proportion of compound cells daily increase till all true epithelium vanished; and the casts contained little else but compound granule-cells, free nuclei, and disintegrated compound cells. The abortive condition of all the cells was without difficulty recognised. In both classes of cases numerous highly resplendent granules, isolated and scattered through the casts, are constantly met with; they are removeable by ether, and are certainly fat-molecules: they are the free nuclei either of unformed or disintegrated cells. They are of little importance, compared with the groups of grape-like clusters of granules, hence called botryoidal, but which occasionally assume a crescentic shape, and but for this appearance they might be viewed as simple aggregations of fat-granules brought together by molecular-attraction; these are severally groups of nuclei without any cell-wall.

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* 'Cellular Pathology,' p. 338.

The pathological import of these clusters of nuclei without any visible cell-membrane has, I believe, in relation to the kidney, never been satisfactorily made out. It has appeared to me, as I shall endeavour to prove in the sequel, that these several forms of granule-cell, compound fat-cell, molecular fat-cell, fat aggregate globules, or by whatever other name they may be described, represent a deteriorated or atrophic state of cell-development, which eventually becomes so powerless that the cell-membrane disappears, nothing remaining but a heap of nuclear molecules, which accumulating in the tubes and Malpighian bodies of the kidney, eventually constitute a true fatty degeneration of the kidney. These grape-like and crescentic clusters of granules in the urine are significant of a subacute process, and imply an atrophic or degraded state of cell-growth, and when they become daily more numerous are very unfavorable indications.

It has also appeared to me that the finely granular material mixed with free nuclei, which appears to constitute the contents of the tubes, and even of the Malpighian bodies in the large white anæmic kidney of acute morbus Brightii, is derived partly from the disintegration of these granular cells, and partly from a diffuse inflammatory exudation, which in these large kidneys is interstitial as well as intratubular. From these reasons, I am reluctantly led to doubt the appropriateness of the term desquamative, or non-desquamative, as applied to some forms of morbus Brightii by Dr. G. Johnson. I have arrived at this opinion, by devoting much attention to the microscopic character of the sediment in many cases of renal dropsy, making drawings, almost daily, of the casts and cells, and watching and recording whatever changes might present themselves, whether in favorable and unfavorable cases; and in the latter, whenever possible, comparing the cell-structure and contents of the tube, with the cells and casts present in the urine during life.

Dr. George Johnson considers that the appearance of granular epithelium, either aggregated together by granular matter in the form of casts, or of cells isolated from each other, is proof of a desquamative process taking place in the kidneys, "the result of a salutary effort to eliminate from the blood, some abnormal products, the retention of which would be attended with injurious consequences,"—and, he thinks, "the escape of this noxious matter from the blood is favoured by this free shedding of the epithelial cells."

It must not be forgotten that this free shedding of epithelium is common to all free epithelial mucous surfaces, which are the seat of inflammatory engorgement or irritation, and the term desquamative bronchitis, or desquamative catarrh, would be as appropriative as desquamative nephritis. From every mucous surface, which is the seat of inflammatory irritation, or hyperæmia, the normal epithelium is abundantly shed, and in the catarrhal exudations of any mucous membrane, the ordinary epithelium may be seen in great abundance, ultimately giving place to cells of various stages of development, regulated by the intensity and duration of the inflammatory process. See Plate V, figs. 5, 6; Plate XIII, figs. 1, 2, 3, Sputa. This shedding of epithelium is the more free in the ordinary mucous canals, because the cells are arranged in a succession of layers, whereas, in the tubuli uriniferi, a single layer only occurs, developed directly from the basement membrane. A microscopic examination, whether of the urine in the early stage of Bright's disease, or of the catarhal exudations from any mucous surface, will demonstrate that a shedding or throwing off of the epithelium of the canal, is among the earliest manifestations of the morbid process.

A careful attention to the earliest symptoms of the acute forms of morbus Brightii, will prove that they have their origin in a period, if not of inflammatory congestion, at least of hyperæmia, or passive congestion, or stasis.

It is this state of hyperæmia which first embarrasses the renal function; some of the constituents of the blood either transude, or direct rupture of the Malpighian capillaries takes place, and blood-corpuscles appear in the urine, not always, however, proportionately to the amount of inflammatory engorgement. In some cases the presence of blood can only be detected by the microscope; in others it is palpable to the unaided eye. This hyperæmic stage is followed by a greater or less exudation of epithelial cells, and with modifications of cell-structure, varying with the intensity of the disturbing cause. In curable and tractable cases the amount of epithelial exudation is trifling, and only lasts for a short period. In some varieties of the disease but little epithelium is thrown off, and what appears in the urine consists of abortive or compound cells, clusters of nuclei, and granular and hyaline casts. In other forms, the epithelial exudation continues for a longer period, and is apparent in some modified form almost to the last hour of life.

For these reasons, I am led to doubt the correctness of the term desquamative and non-desquamative nephritis. I would prefer that of acute and chronic albuminous nephritis, did I not think that a tribute of justice and respect is due to our distinguished countryman who first discovered, recorded, and illustrated this form of disease; and, in common with the most celebrated of the Continental pathologists, I prefer speaking of the disease as the morbus Brightii, in its acute or chronic form.

That variety or stage of the disease to which Dr. George Johnson applies the term non-desquamative, comprises not the least frequent form of Bright's disease; and he admits the relation which non-desquamative disease sometimes bears to acute desquamative nephritis, the former being the sequel to the latter.

I am inclined to think that in all those cases which are classed as examples of non-desquamative disease, the examination of the urine was made at a time when the primary stage had passed away, and when the transparent hyaline casts, without any or but few epithelial cells, were visible; and which appearance I believe emphatically marks the temporary or permanent decline of the disorder. (See 'Hancock's and Welch's Cases,' Pl. IV.) In Dr. George Johnson's, Case XXII, p. 352, the dropsy was of a fortnight's duration, the urine contained small waxy casts, with *scarcely any* epithelium, and few if any blood-corpuscles.

The presence of *some* epithelium and *some* blood-corpuscles, from my point of view, leads me to the conclusion that during the antecedent period the urine had contained both epithelium and blood—evidence of engorgement and inflammatory irritation. But if even from the first outset of the disease the epithelium had been scanty, although the casts became granular, and blood-discs became visible, the interpretation I should give would be, that the absence or small amount of the epithelium was to be accepted rather as a most favorable indication of probable recovery, than a justification for calling the disorder one of non-desquamative nephritis.

The correctness of Dr. George Johnson's observations are not —cannot be impugned; they may, almost daily, be verified. There is a period in favorable cases where little or no epithelium is visible; and where transparent, hyaline, or waxy casts are alone seen. It is only with the conclusion drawn from the absence or scantiness of epithelium at this stage that I venture to disagree. Dr. George Johnson has been so able a pioneer in this branch of pathological research, he has so well indicated the way in which these forms of disease may be most successfully investigated, that I regret to differ from him in so small a matter as the fitness or appropriateness of his nomenclature.

# CHAPTER VI.

## DESCRIPTION OF THE SEVERAL FORMS OF CASTS, AND THEIR SIGNIFICANCE.

*The blood-cast. The fibrinous or coarsely granular cast. The granular epithelial cast. The finely granular semi-transparent cast. The hyaline or transparent cast. The cloudy or waxy cast. The fatty or oily cast. The pus-cast.*

*The blood-cast.*—The tube-casts seen in the sediment of albuminous urine, and containing various forms of cells, present to the eye very different degrees of clearness or transparency. This appearance may vary from something very closely granular to complete transparency; and many degrees of gradation are met with intermediate between these extremes. The most coarsely granular of these casts contain only blood-corpuscles, and is oftentimes stained of a yellowish-red. It is considered as fibrine, coagulated and moulded in the renal tubes, and is the product of hæmorrhage from rupture of the Malpighian capillaries. These blood-casts are always found in hæmaturia after scarlet fever, and in the early hæmorrhagic stage of acute morbus Brightii.

*The fibrinous or coarsely granular cast.*—These present a coarsely granular appearance, and are free from blood-cells or other evidence of cell-structure. By some these have been viewed as formed by coagulated fibrine. But it must not be supposed that these fibrinous cylinders are formed out of coagulated fibrine, as the blood-casts appear to be; for the word coagulated implies the separation of the fibrine from the other constituents of the blood, by a process analogous to what takes place in hæmorrhage or in the coagulation of the blood out of the body. Wedl ('Pathological Histology,' p. 257) says, whether these deserve the name of fibrinous cylinders is perhaps very problematical, since the coagulation of fibrine into molecules, or a molecular form of fibrine, has not been demonstrated.

These purely granular casts without evidence of cell-structure apparent in them are of frequent occurrence in cases where the circulation within the kidney becomes embarrassed from simple obstruction to its flow of blood through the cava, which happens in pulmonary and cardiac dropsies. It is observed in such cases that the dropsical condition of the lower extremities may exist for a long time, and the urine continue free from albumen. But as the obstructive conditions increase, the renal circulation at length becomes affected, and albumen appears in the urine.

It is in such cases that these purely granular casts become visible, and so long as they are unaccompanied by renal-cells or granule-cells, they imply a very remediable state of the kidneys, if the pressure to which the renal circulation is exposed can be even temporarily relieved. This will be illustrated hereafter.

*The granular epithelial cast.*—These coarsely granular epithelial casts found in the urinary sediment in acute morbus Brightii are considered by continental writers as true croupous exudations. Scherer has described these urinary cylinders as similar to false membranes, and having many characters in common with the fibrinous exudations of croup. That this is the correct interpretation of their origin is, I think, confirmed by the presence of flakes of amorphous fibrine, very granular, and stained with hæmatin, which are seen also in the sputa of the early stage of pneumonia, as well as in croup. And, moreover, within these coarsely granular epithelial casts, as the disease advances, pus-cells or their prototype are frequently seen associated with granular cells, proportioned to the intensity of the disturbing cause. Analogous conditions are seen in the croupous inflammation of other epithelial surfaces.

In plastic or fibrinous bronchitis, an exudation forms in the smaller bronchial tubes, strictly analogous to these fibrinous or granular epithelial casts of the renal tubes. The microscopical appearance of this bronchial exudation is that of a coarsely granular material, containing epithelial cells, granular cells, and exudations, or even pus-corpuscles: and it is in every respect similar in character, and I think in origin, with the fibrinous and coarsely granular epithelial casts now under consideration. Plate I, figs. 2, 5, 8; Plate II, figs. 2, 7; Plate XIII, figs. 2, 3.

*The finely granular, semi-transparent casts.*—In albuminous urine casts are often seen, not so coarsely granular as the last—finely granular, in fact, and approaching towards transparency—which cannot be considered as the product of a croupous form of inflammation. It is worthy of notice that these finely granular casts are usually accompanied by few epithelial cells; but these cells are more granular than the standard epithelium of health, and with them are seen non-nuclear and highly granular cells, the earliest and perhaps the simplest departure from the healthy spheroidal epithelial cells. As the disease continues, the cells undergo manifest change; these non-nucleated granular cells increase, and are accompanied by cells containing many nuclei, having something of the character of the so-called compound inflammation-corpuscle of Gluge.

Dr. Gairdner, with whose views I have to express my perfect accordance, and whose opinion on many points I seek only to confirm, in his excellent treatise on the Pathological Anatomy of the Kidney ('On the Pathology of the Kidney,' p. 42), has referred to the imperfect development of the epithelial cells, and to the analogy of the changes with those which occur in diseased mucous membranes in general; and he remarked that Henle was the first to show that the essential phenomenon in all mucous catarrhs and inflammations, was the increased formation of epithelial cells in various stages of growth, accompanied by an increased quantity of viscid mucous secretion.

Atrophic or degenerated cells undergo disintegration readily and with rapidity. It is well known how speedily the cell-membrane of the compound inflammation-corpuscles of Gluge disappears, leaving groups of molecules, the grape-like (botryoidal) clusters of granules, so frequently seen in the tube-casts of albuminous urine in acute and chronic morbus Brightii. In a similar manner the granular non-nucleated cells disintegrate, and the fine granular viscid contents of the cell, diffused through the renal tubes, is moulded to their shape, and appears in the urine, with a few isolated epithelial or other cells.

I therefore think that this finely granular, semi-transparent cast is derived from the disintegration of atrophic epithelial and granule cells, and that it is formed in a manner similar to the viscid mucous secretion in catarrhal affections of other mucous membranes. Practically it is difficult to separate this form of cast from the hyaline or transparent cast next to be considered, as they both appear to be derived from a similar source, and to merge one into the other, and to have many characters in common with catarrhal secretion in general. Pl. II, figs. 8, 9, 10.

*The hyaline, or transparent casts.*—These several names are applied to certain transparent, clear, cylindrical-looking forms, which frequently appear in the sediment of albuminous urine. They are more abundant and more frequent in the chronic forms of morbus Brightii than in the acute. They are present in the urine of the mildest and most tractable cases equally with the severest and most fatal. Their significance has been variously estimated; their true import will, I think, be found to depend on the cell-structure with which they are associated.

Dr. George Johnson considers them to be moulded in tubes which have been entirely deprived of epithelium by the desquamative process; yet he says their appearance in acute nephritis is by no means uncommon, but that they occur in much less proportion than the granular epithelial casts; he does not profess to determine their nature. They are sometimes, though rarely, perfectly clear and homogeneous, and unaccompanied by cell or structure of any kind. Minute spherical discs, somewhat resplendent, and which may be mistaken for free fat-granules, are occasionally present. They appear to be the nuclei of unformed or of disintegrated epithelial cells. (Pl. I, fig. 12.) These hyaline cylinders now and then contain traces of granular matter, and occasionally one or more perfect or abortive epithelial cells. (Pl. V, figs. 4, 9.) These are the finely granular casts described in the preceding section. Frequently a compound granular cell may be brought away with the cylinder; and lastly, more or less fatty material may become associated with these transparent tubes, for the oily and fatty casts are nothing more than these transparent cylinders loaded with those products.

If we compare the material thrown off from mucous surfaces generally,* when under the influence of acute or chronic inflammation, with these exudates from the tubes of the kidney, a very strong resemblance, if not identity of character, in these morbid processes will be apparent. Free exudation of epithelium is an essential phenomenon in all inflammatory states of mucous surfaces, as has already been stated. If we examine the excretory products of any kind of catarrh, of the Schneiderian membrane, of the pharynx, larynx, bronchial tubes, stomach, intestines, or bladder, epithelial cells in various stages of development, from the perfect standard cell to the abortive denucleated one, with compound granule cells (Gluge), resplendent molecules and granular matter are seen held together by a thin but viscid tenacious fluid, clear and glairy, or in parts finely granular, which appear to constitute the fluid portions of these mucous excretions. From the larger mucous canals this viscous secretion appears spread out or smeared over the surface, and is detached in films or flakes, the diameter of the canal being too large to permit it to be moulded to its cylindrical shape. (See Plate V, figs. 5, 6, and Plates XIII, XIV.)

The tubuli of the kidneys are essentially mucous canals, and under the influence of inflammatory irritation give out products strictly analogous to those which are formed from other mucous surfaces. If the glairy, grayish, viscid mucus in mild but chronic bronchial catarrh be examined under the microscope, the observer must be struck with the resemblance which the appearance presents, to the casts, whether granular or transparent, thrown off from the tubuli of the kidneys. (Compare Pl. XIII, figs. 2, 3, 4, and Pl. V, figs. 2, 3, 4.) Perhaps the most satisfactory comparison is that made between the bronchial expectoration of those suffering from albuminuria, and the tube-casts found in the urine of the same patient. In these several examples there may be seen the epithelium accompanied by cells of varying degrees of development, held together by a glairy, viscid mucus which in some is slightly granular, in others coarsely granular, and different only from the exudation from the tubuli of the kidney, in that the masses are filmy or flaky instead of cylindrical or tubular. A manifest difference, however, between the two must not be overlooked: in bronchial or catarrhal mucus the film-like masses readily cohere and become miscible, as it were, one with the other; the tubular exudate from the kidney preserves its individuality, and has no disposition to intermingle, cohere, or mat together. The action of the urine, with which these casts are mixed so soon as formed, may explain this difference: this saline acid fluid acting on the mucus and destroying its ordinary miscibility, and perhaps rendering it more granular.

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* See anté, pp. 38, *et seq.* Plates XIII, XIV, figs. 1—4.

It may be objected to this view that the formation of mucus takes place only in the follicles of the mucous membrane; and that as no such structure exists in the kidney, that this exudate from the tubes can have no identity with the viscid material thrown off from other mucous surfaces. But it is a matter of great doubt whether these mucous follicles are the source of mucous secretion. In health, in canals which require lubrication for the more ready performance of the function of transmission, the mucous follicles doubtless contribute to such a condition, and readily pour forth a watery fluid on the application of the accustomed stimulus. But catarrhal mucus is totally unlike healthy or follicular mucus. The latter is perfectly clear and watery, and contains a few natural healthy epithelial cells. The former is more or less viscid, tenacious, and granular, and contains epithelial cells in various stages of development. There is reason, then, for supposing that the viscid glairy fluid formed by all mucous epithelial surfaces which are the seat of catarrhal inflammation or irritation is produced by the disintegration of the numerous cells which are abundantly formed and shed, and as rapidly broken up. It is quite certain, and may be verified at any moment by the examination with the microscope of any catarrhal fluid, that wherever this kind of excretion is formed, epithelial cells in various degrees of development or transformation, with abundance of free nuclei, and some granular matter, constitute the essential parts. The relation of the viscid fluid to these cells may be a matter of discussion—whether the fluid is essential to the formation of these cells, or whether it arises from the disintegration or breaking-up of them. Lehmann considers that this viscid mucus is derived from the disintegration of epithelial cells, and this latter view is supported by the authority of Scherer and Virchow. (Lehmann's 'Physiological Chemistry,' Sydenham Soc. Ed., vol. i, p. 377.)

Between the nucleus and the cell-wall of all cells is contained a viscid hyaline fluid, which, on the breaking up of the cell, becomes dispersed and exhibits the characteristic tenacity of mucous secretion. The well-known action of alkalies on cell-structure will exhibit this property of the contents of the cell. A drop of liquor potassæ converts pus-cells, or exudation corpuscles, into a ropy, viscid mass, which under the microscope is seen as a glairy fluid, with many resplendent molecules, which are the nuclei of the disintegrated cells; and if the experiment be skilfully conducted, the appearance in the field of the microscope very much resembles ordinary pituitary mucus from the Schneiderian membrane.

The significance of these hyaline or transparent casts will depend on the cell-structure which accompanies them, and on the relation, as to time, which other kinds of casts bear towards them. If they appear in the urine very shortly after the period of hæmaturia they may be accepted as indicative of a state somewhat analogous to a catarrh of the renal tubes (see Plate

IV), and the case in all probability will prove remediable and tractable. In such cases here and there an epithelial cell is seen, and perhaps a compound granule-cell, but these are not numerous, and they do not increase.

*Of the fatty or oily cast.*—The most untractable and hopeless form of morbus Brightii is that represented by the presence of the fatty or oily cast. These casts present the appearance of hyaline or slightly granular cast, in which at first abortive cells, compound granule-cells and clusters of resplendent granules, without an evident cell-wall, are present. Plate VII, fig. 4; Plate VIII, figs. 1, 2. The latter increase in quantity; the fat-granules appear larger and more refractive, and collect into groups, which from their increasing brightness assume the aspect of oil grains.

These conditions are found in cases of albuminous urine, associated with phthisis, cancer, &c., and are also expressive of the so-called amyloid form of degeneration of the kidney. In the most advanced cases the cast seems made up of these fatty or oily materials, and hence has acquired the name of the fatty or oily cast. These indicate the highest state of fatty degeneration.

*Of the waxy cast, cloudy, or glassy cast.*—There is yet one other variety of hyaline, or transparent cast, which has been called, from the absence of all structure visible in it, the waxy cast—certainly from no resemblance which it has to wax,—and which, from the difference in the diameter of them, may be formed either in the smaller convoluted tubes, or in the larger straight tubes of Bellini, the origin and nature of which has been variously estimated.

Lehmann ('Physiological Chemistry,' vol. ii, p. 397), speaking of the tube-like, or cylindrical bodies, occurring in the urine, and concurring in the view that the granular cylinders are true croupous exudations, appearing in all the inflammatory renal affections which are usually included in the acute form of Bright's disease, mentions these transparent casts as a third form, which occurs in the shape of hollow cylinders with walls, which are so perfectly hyaline that they cannot be detected by the microscope, unless by modifying the light. "They generally," he says, "occur, only scattered in the chronic form of Bright's disease, in fully developed fatty degeneration of the kidneys." An epithelial cell, or the rudiment of it, may often be observed in these species of cylinder, and Lehmann considers these transparent casts as the *membrana propria* of the urinary ducts. This *membrana propria* of Lehmann is the basement or germinal membrane of the renal tubes, and to suppose that it can be shed or cast off is inconceivable to any one acquainted with histological anatomy. I cannot coincide with this view, I have always supposed them composed of some viscid material; their outline is peculiar, often exhibiting fissures of the margin. Pl. IV, fig. 12.

These so-called waxy casts are of different import to the hyaline or transparent cast. Their fanciful similarity to a wax mould or cast of a tube is very difficult to realise. In the ordinary hyaline cast, some vestige of cell-structure is usually apparent, a little granular appearance in one part, or here and there a resplendent granule, the nucleus of a disintegrated cell. But the waxy cast, erroneously so called, is devoid of any similar accompaniments. It is quite translucent, its margins are perhaps faintly opalescent, and by management it may be made to roll round in the field of view, and its apparently solid character demonstrated. Its margin often exhibits fissures. They are sometimes seen in conjunction with the ordinary hyaline cast, with its occasional isolated nuclei. Pl. V, fig. 4, shows one in conjunction with the ordinary hyaline cast. It is, however, very difficult to convey by engraving the special character belonging to them. They are of more serious import than the simply hyaline cast, as they are chiefly seen in chronic forms of morbus Brightii, and I believe indicate the granular or slightly nodular kidney. They are also seen in the more unfavorable forms of the gouty or atrophic kidney. They often indicate an amyloid reaction with iodine.

*The pus-cast.*—These pus-casts are examples of cells having reniform or trefoiled nuclei, rendered very clear and distinct by dilute acetic acid.

They may be aggregated together in a tubular form, Plate IV, fig. 11, or they cohere together in irregular number, as seen in Plate VIII, fig. 12. They are transitional cells derived from the epithelium of the renal tubes, less frequently formed, however or seen in the casts than the simple mono-nuclear, cloudy, or granular epithelial cell. They nevertheless are occasionally seen.

Attention to the microscopic character of these several forms of casts will enable the practitioner to estimate the nature and intensity of the disease, its advance or decline, its form, and its probable termination. The blood-casts represent the period of active hyperæmia and hæmorrhage, the coarsely granular epithelial cast, with its compound inflammation corpuscles, and accompanied by amorphous granular flakes, stained with hæmatin, the period of inflammatory exudation; the finely granular, semi-transparent casts, with scattered epithelial and granule cells, the subsidence of that stage. Transparent casts, with compound cells, with isolated, resplendent molecules, and grape-like clusters of granules, represent a stage of chronic, sub-acute disease of grave import; and if these casts become more and more loaded with large and gradually increasing fat-granules, and even oily drops, the progress of fatal fatty degeneration is clearly marked.

# CHAPTER VII.

## EVIDENCE THAT THE DEGENERATION OF TISSUE IN FATAL CASES OF MORBUS BRIGHTII IS NOT LIMITED TO THE KIDNEYS.

THE various forms of casts just described are closely indicative of the stages, as well as of the intensity of the renal disorder in cases of dropsy with albuminous urine. They are accepted as evidence of a certain degree of cell deterioration, but it must not be inferred that these deteriorating conditions are limited to these organs.

For there is reason to believe that the nutrition of other textures and organs proportionately fails; and although not so apparent, because incapable of being determined or demonstrated during life, nevertheless the tissues throughout the organism become more or less degenerate and inefficient for the purpose of life.

Alteration of cell-structure may be traced in tissues far remote from the kidneys.

Even in the acute form of morbus Brightii cases which have run their fatal course in a few weeks the epithelial cells of other parts present a granular and imperfect appearance. The epithelium of the mouth, throat, and alimentary passages is granular, and sometimes even fatty, the pavement epithelium of the bladder often most prominently so. The epithelial cells of the bronchial mucous membrane are cloudy and granular, and accompanied by evidence of cellular deterioration identical in character to what we witness in the renal tubes.

Even in the most acute cases structural changes in the heart-fibre are present.

Virchow* says the small arteries which lead to the epithelial layers are everywhere diseased; and not only in the most advanced forms of renal degeneration, such as that known as the amyloid degeneration, but in the other various forms of renal dropsy, the small arteries of the whole digestive tract, from the buccal cavity to the anus, are similarly affected.

The inevitable result of this wide-spread decay is that the parts and cells which are the seat of it become inefficient in their power of ministering to the functions either of nutrition or excretion. The gland-cells imperfectly perform the function of secretion, and the vessels supply defective nutrition to the tissues from which the epithelial gland-cell is formed.

A few proofs of this widespread degeneration may be adduced.

The bronchial mucous membrane exhibits remarkable proofs of the wide spread degeneration of tissue. Plate XI, fig. 4, represents a vertical section through one of the smaller bronchial tubes. No trace of ciliated epithelium is visible; the successive layers of cells, as they form, are more indicative of the mucous corpuscle or effete cell than of the layers seen in healthy tissue. Immediately beneath the basement membrane the fibro-elastic tissue is seen studded with fat-granules, and subordinate to it the layer of unstriped muscle is seen also fatty and degenerating. Figs. 5 and 6 represent these layers separately and more highly magnified.

The expectoration in these cases of morbus Brightii is represented in fig. 3, and presents the usual evidence of imperfect cell development invariably present when a mucous membrane is the seat of nutritive or irritative disturbance.

Nor must the change which takes place in the ordinary fat-cell of the subcutaneous connective tissue be overlooked; this, which in health contains fat more or less solid, and which may be considered to represent its ordinary nutritive contents, in these states of general anasarca contains only a few fluid drops of oily-looking fat, but is crammed to over-distension with a thin, serous, albuminous fluid.

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* Virchow, p. 378.

With these facts before us, we must be led to the conviction that the agency of deterioration in renal dropsy is not a local agent, manifesting itself only in renal cells, but that it is some widespread depressing influence, pervading the organism; operating perhaps, less palpably, but not less fatally, everywhere.

I may here be permitted to remark, with regard to this universal decadence, that, throughout the entire series of epithelial mucous membranes, there appears to exist a uniform law of decadence common to all the epithelial cells, whatever the function of those cells may be. So that whether they be the scaly or pavement, the spheroidal or glandular, the oval or ciliated—whether the function of the cell be secretory or simply protective—when under the influence of a morbid cause, they severally exhibit a departure from the healthy type of the tissue to which they belong in a direction common to them all.

They first become cloudy, swell, and look rounded, and apparently filled with a fine granular matter, in which the nucleus is concealed; this is the so-called mucous corpuscle; the nucleus, in many of these cells, becomes much larger in appearance, and the contents more distinctly granular. All these cells may rapidly disintegrate, and yield, by their breaking up, the mucin which is so abundant in all catarrhal affections in which these cells are so numerous. Next in order we meet with cells with highly resplendent nuclei, refracting light highly. These fatty nuclei accompany cells of much larger diameter. These are the so-called Gluge's inflammatory corpuscles. Other cells continue to exhibit well-formed nuclei, but differing materially in form from those aready noticed. They are smaller in diameter than the fat-granule-cell (Gluge's). The nucleus may be made very distinct by dilute acetic acid; and it presents various forms or appearances—reniform, trefoiled, as if undergoing multiplication by division. The true pus-cell presents the conditions of the latter, exhibiting a more or less distinctly trefoiled or reniform nucleus. These several forms of cell in the case of those epithelial textures which are composed of numerous layers of cells, as the bronchial mucous membrane, may be seen almost simultaneously, or at any rate in very rapid succession.

Whenever a disturbing cause, irritative or inflammatory, exercises its influence on epithelial membrane, these appear to be the successive modifications which the cells undergo.

There is, however, one circumstance connected with these modifications of the cellular elements of mucous membranes which must be kept in view. It is the relative frequency or infrequency of the pus-cell from these epithelial structures. It is very common from some, equally rare from others. It is very common from the whole length of the pulmonary mucous membrane, from the pelvis of the kidney, from the ureters, bladder, or urethra. It is equally rare from the gastro-intestinal track, or from the tubuli uriniferi.

The explanation of this fact is found in the arrangement of the cellular elements in these several varieties of epithelial structure.

In the first-named parts the cells are superimposed in a succession of layers. (Plate XI, fig. 4.) Any disturbing cause leading to the shedding of the first series, and continuing its irritating influence, prevents the cells beneath either from arriving at maturity, or so modifies their development that a succession of transitional cells follows; and where the irritation assumes the form of the so-called inflammatory action, the pus-cell is produced in great abundance.

The formation of these cells, it may be observed, is not at the expense of the integrity of the tissue out of which they are formed.

On the other hand, in the gastro-intestinal and renal layers the epithelial cells occupy but a single row, and are developed directly from the germinal or basement membrane. Hence, although they undergo transitional states, passing from the true cell to the granular and mucous cell, they rarely possess the character of the pus-cell, and when they do so can only become developed at the expense of the subjacent tissue, or, in other words, can only be formed by an ulcerative process, with loss of substance.

To return to the subject of the condition of the cells in other organs in Bright's disease.

If we now turn to the inner parts of the body, when a post-mortem examination permits us to investigate the state of parts hidden from us during life, in all those cases in which fluid has been present in the abdominal cavity, the abdominal serous membrane presents an opaque aspect, different from what we witness in cases, for instance, of violent death, where this membrane looks translucent and clear, smooth and shiny.

If a portion of the peritoneum be scraped, the wavy fibrous structure and the tesselated epithelial cells have always appeared to me highly granular, participating in the general cloudy character of the epithelial cells elsewhere.

But the surface of the heart—the exocardium—particularly in the majority of cases of morbus Brightii, exhibits those well-known spots called the *maculæ albidæ*, shining, opalescent, and opaque patches, of which pathologists have noticed two varieties—one variety looking like a morsel of false membrane laid on and adhering to the subjacent serous surface, with a well-defined margin, which can be raised and peeled off. These appear to be in the nature of inflammatory products, although the history of the case rarely yields any evidence of any antecedent pericardial attacks. This form is, however, infrequent as compared with the next, in which the opacity gradually merges into the surrounding tissue. There is no appearance of a raised edge, and the patch looks simply like a milky white stain.

The tesselated epithelium of this surface is lost, and in its place nothing but a débris of granular matter can be seen, interspersed with coarse interlacing fibres, which seem to inclose the granules, together with numerous fat-granules.

(Plate XII, fig. 1.) The muscular walls of the heart are not usually unhealthy looking to the eye, or flabby in texture. These conditions would prove nothing; but if a careful microscopic examination of the muscular substance be made, proof may be obtained that here also is degeneration and decay. There is a universal tendency to fatty and granular degeneration.

The muscular striæ, instead of being clear and distinct and well-defined, are studded with granules, which here and there, in the larger form, become resplendent and highly refractive, presenting all the character of a fatty débris, which they really are, as may be clearly proved by the action of ether, which quickly removes them, leaving the fibrillæ naked and destitute in these spots, of all indications of striæ. (Plate XII, fig. 2.)

Not only is the evidence of degeneration to be observed in the muscular structure of the heart—both in ventricles and auricles—but oftentimes opaque spots are seen studding the commencement of the aorta, and extending in patches, to a greater or less extent, throughout the vascular system.

Figs. 3 and 4, Plate XII, represent the microscopic appearances of one of these so-called atheromatous patches. It reveals the presence of much fatty débris, with here and there a plate or two of chloresterine. Fig. 4 represents a vertical section through one of these aortic patches. Both were taken from chronic cases of morbus Brightii.

The liver, in the majority of fatal cases of morbus Brightii affords unequivocal proof of the disturbance which this organ suffers. Every cell appears loaded with fat. No pigment-grains are present, but the liver-cells appear overcharged with large, round, resplendent fat-granules, giving such a fatty character to this organ, that bacony liver is the term often applied to it. The ordinary appearance of the liver-cell in morbus Brightii is represented in fig. 5, Plate XII.

If one of the minute nodules from the surface of a kidney in almost any form of morbus Brightii except the acute form, be separated and examined with the microscope, the convoluted tubes appear filled with detached cells, surrounded by a fine granular matter, with here and there fatty débris scattered among them. (Fig. 6, Plate XII.)

May we not now appreciate the significance of that form of dropsy which, associated with albuminous urine as one of its earliest and most easily recognised conditions, pervades all the tissues, infiltrates every cell, interferes with and stagnates every function, and oftentimes becomes the immediate cause of death, by literally drowning the individual in his own fluids.

But, furthermore, this form of dropsy signifies a wide-spread deterioration of cell development; it signifies, not a local disease of the kidneys, but a decay and depreciation of tissue everywhere. For if we obtain evidence of deviations from so many remote points, we may safely infer that a like decay or deterioration of structure exists elsewhere.

The progressive transformation of the epithelial structures in unfavorable cases of renal dropsy is therefore to be accepted as evidence of a diffused and general degeneration and decay, as well as of a local and special disease of the kidneys. It is by keeping this fact constantly in view that we may hope to establish a definite principle of treatment; not directed exclusively to the kidneys, as the apparent failing organs; but to the constitution generally: aiming at the restoration of the blood to a condition favorable to a more healthy cell-development, with the hope that those functions which a retrogressive cell-formation has impeded, will speedily be re-established so soon as the vital fluid has returned to a standard condition of health.

If these facts be duly estimated, their influence over the principles which should guide the physician in the selection and employment of remedies, will be most beneficial; and I think it may not be presumption to conceive that the success which attends the more modern treatment of these dropsies, as compared with the results of past days, may be confidently traced to a better appreciation of the widespread character of the morbid processes, rather than limiting them to a local disease of the renal organs.

# CHAPTER VIII.

## THE VARIOUS FORMS OF DISEASED KIDNEY OF WHICH EXAMPLES ARE GIVEN IN THE FOLLOWING PAGES.

The following are the several forms of diseased kidney, connected with dropsy and albuminous urine, which I have had an opportunity of studying microscopically, as well as of examining the urinary sediment during life. They belong to the pathological series, which is entitled to the generic name of morbus Brightii, from the distinguished physician who first described them. I do not venture to assert that they represent different stages of *one disease*. Although the first, second, and third forms, with great probability stand in that relation to each other; the first two representing the acute, and the third the chronic stage, I would rather say that the whole group may be viewed as examples of the direction which degeneration of structure takes when the impaired or weakened vital force is specially manifested in the kidneys; and though considerable variation in external aspect, volume, and weight are apparent, yet, nevertheless, each exhibits a similar tendency to cell-deterioration, differing more in degree, than in form.

1. The red, chocolate, or plum-coloured kidney, somewhat increased in weight, the cortical surface studded with deep-coloured arborescent vascularity; the same evidence of congestion pervading the whole organ. It represents the stage of inflammatory engorgement. The Malpighian bodies are seen filled with extravasated blood; or these, as well as the convoluted tubes, are distended with a fine molecular exudation or deposit, deeply stained with hæmatin.

II. The large, pale, white or yellowish-white kidney, more or less lobulated, and much increased both in volume and weight. The capsule non-adherent, and the cortical surface smooth and marked with a few star-like spots of vascularity. The cones are usually of a pale flesh tint; they appear small from the great apparent extent of the cortical part; they sometimes appear buried in, or almost obliterated by, the great amount of deposit. The Malpighian bodies and convoluted tubes, as well as the interstitial parts, appear choked and distended to the utmost by a fine molecular exudation in which free nuclei and fat-granules, and disintegrated cells may be seen. There are intermediate conditions between these two forms, the difference consisting only in colour, amount of exudation, and the rapidity with which the disease runs its course.

III. The kidney is increased in volume and weight, is of a reddish or yellowish-brown colour; the cortical surface is either finely or coarsely granular; and the capsule being slightly adherent, when removed the well known granulations of Dr. Bright become apparent.

These granulations the microscope shows are the Malpighian bodies, and contiguous tubes stuffed with a fine molecular product or exudation, in which free nuclei and fat-granules are mixed.

IV. The kidney is but little augmented in volume and weight. The capsule is less tenaciously adherent, and when removed the cortical surface presents a granulated surface not unlike salmon-roe. The colour is a yellowish-fawn, sometimes a reddish-yellow. The contents of the convoluted tubes and Malpighian bodies appear similar to the last form, except that the free nuclei are more numerous, the fat-granules more abundant, and there is a greater proportion of broken-up cell-structure.

V. The kidney differs from the last only in the cortical surface being tuberculated rather than granular. The increase of weight is variable. The colour is sometimes a grayish or dirty-yellow, or a sombre-fawn. A starlike distribution of vessels is seen on the surface, and a section shows some injected vessels running perpendicular to the surface and in the direction of the base of the cones. These appear of a red flesh-tint, and appear striated from vascular injection. The tubular structure of the cones seems frayed out at the base. The section of the cortical part exhibits a white appearance in the intervals of the vascular striæ. The Malpighian bodies and convoluted tubes appear to contain granular matter and fat-grains, the latter predominating.

VI. The kidneys are variable in regard to increase of size and weight, generally of a soft flabby consistence. The capsule is easily detached, and the cortical surface is smooth, shining, and of a pale waxy whiteness, with a few arborescent vessels on the surface. The cortical part is slightly striated, the intervals of the striæ having a glistening appearance of a spermaceti brightness rendered more shining and resplendent under water. These spermaceti-like spots exhibit an amyloid reaction with iodine. The Malpighian bodies and convoluted tubes are everywhere filled with highly resplendent aggregations of fat-granules, sometimes even presenting an oily appearance; and the cell-structure is throughout more or less fatty or degenerated. This is the fatty, waxy, or amyloid kidney of some pathologists.

VII. The kidney is diminished in volume and weight, shrunken or atrophied, often irregular in shape; in substance dense and firm; the capsule adherent; the cortex studded with nodular eminences varying in number and size. The colour of the kidney is red or a brownish-red. The cortical layer is reduced to a minimum of thickness so that the base of the cones seems lost in the external circumference. The cones are striated, and of a deeper colour than the rest, and appear to be the only part of the organ remaining. Microscopically examined the cortical parts seems reduced to a fibrous structure, in which an original tubular arrangement is with difficulty traced. In the nodular eminences a few convoluted tubes may be teazed out, and their canal appears filled with a dense granular material; the epithelial cells are everywhere detached and undergoing disintegration.

This atrophied state of the kidney has been compared by Henle to cirrhosis of the liver. But in this latter form of atrophy there appears to be a new formation of connective tissue with a shrinking or absorption of the hepatic cells and parenchyma; while in the shrunken and atrophied kidney I have never been able to satisfy myself of the presence of any new formation, but only of the obliteration and condensation of the tubular structure. At very advanced periods of life the kidney is often seen thus atrophied, particularly as to its cortical substance.

This last form, although always associated with albuminous urine, does not give rise to dropsical symptoms beyond slight œdema of the ankles, and sometimes not even to this. It is most commonly fatal by uræmic poisoning, coma, or convulsions. It is frequently met with in the gouty habit of body, and has been appropriately termed the gouty kidney by Dr. Todd.

I am not prepared to say that these comprise all the forms of diseased kidney associated with albuminous urine, or that may have been described under the name of morbus Brightii; they are, however, the principal and most common forms, and they are those which I have had the opportunity of studying, and of examining the urine during life. I have made no mention of the cysts which are sometimes seen in great numbers in the granular kidney. I have known them so numerous as not to be counted, varying in size from a millet-seed to that of a pea, or even larger. They do not seem to have any direct connection with the fundamental disease, as, although sometimes present, they are not a constant accompaniment of granular kidney: I avoid the controversy respecting their origin. We have no means of detecting their presence during life, and we have, at present, no cause to believe that they give rise to any symptoms. They are often seen in the kidneys of people advanced in life, who, there was no reason to believe suffered from any renal disorder.

# CHAPTER IX.

## IDENTITY OF SCARLATINAL DROPSY AND ACUTE ALBUMINURIA (MORBUS BRIGHTII).

In considering the several forms of renal disease connected with dropsy and albuminous urine, and in tracing the character of the cell-degeneration which marks their progress, it will be most convenient to commence with the simplest form, that in which the inflammatory origin of the disease is the most manifest, and in which, in fatal cases, the cell transformation is most apparent and most readily demonstrated. The early stage of these cases is marked by the presence of blood in the urine, either visible to the unaided eye or recognised by the microscope. It cannot be doubted that the dropsy which follows scarlet fever exhibits all the characteristics of an inflammatory origin. It is ushered in by a secondary febrile attack, with evidence of renal engorgement. In unfavorable and fatal cases a rapid destruction of epithelial cell-structure is apparent, accompanied by the exudation of an inflammatory product, which accumulates in the uriniferous tubes and Malpighian bodies, increases the size and weight of the organs, and developes all the conditions recognised as characteristic of the acute form of morbus Brightii.

The examination of the urinary sediment from time to time in these cases will furnish information of the nature of the process going forward in the kidneys; and, from the evidence which the microscope supplies, a favorable or unfavorable opinion may be formed with great precision and certainty.

Careful attention to the material thrown off from the kidneys will, I think, satisfactorily prove that the foretoken of danger is the appearance of degraded or atrophic cells, rather than the desquamation of epithelial structures in the form of granular epithelial casts. For so long as the epithelial cells remain unchanged, a favorable termination may be expected. When these cases of dropsy after scarlet fever prove fatal from the third to the fourth week after the commencement of the secondary fever, the kidneys invariably present appearances identical with what is seen in that form of morbus Brightii recognised as the acute; and from this point of view the inflammatory origin of one form of renal degeneration is established; as well as that scarlet fever, at certain periods of life, and in certain habits of body, must be classed as one of the most efficient and active causes of renal degeneration.

The exception to this will be found in those cases of scarlet fever where death occurs either during or immediately after the eruptive period; that is to say, within ten days from the commencement of the eruptive period. In such cases the kidneys are gorged with blood; they are of a purplish red or deep madder-brown red, and give out blood in abundance when a section is made. The uriniferous tubes in these cases are found filled with sanguineous, fibrinous coagula loaded with blood-corpuscles, and of a deep red colour. But this congestive condition, in the majority of cases, rapidly passes away, dropsical symptoms supervene, and, if the patient dies from the third to the fourth week from the period of the secondary fever, the kidneys uniformly present evidence of increase of size and weight,—they are pale and faintly granular, and of being the seat of a morbid process which is very similar in character with what is found in the acute form of morbus Brightii. The late Dr. Miller ('The Pathology of the Kidney in Scarlatina') describes the appearance of the kidneys in the fatal cases which came under his observation during the epidemic of scarlet fever in 1848. One or two are characteristic of the hyperæmic period, but the rest exhibit the kidneys as of a pale colour as regards the cortex, yellowish or yellowish white, and presenting the appearances usually noticed in acute albuminuria.

### *Hæmaturia after scarlet fever.*

Hæmaturia after scarlet fever is no uncommon occurrence; it is always associated with more or less of general dropsy, with a pasty, spanæmic appearance of the surface of the body. In the great majority of cases, it is a morbid condition, perfectly manageable, quickly yielding to judicious treatment, and only in exceptional cases either leading to, or associated with permanent and organic mischief of the kidneys.

A question of much pathological interest arises out of the study of these cases—namely, whether the congested or impeded state of the circulation in the kidneys is mainly dependent on arrested cutaneous function during the desquamation of the cuticle; or is it evidence of the imperfect elimination of the febrile poison during the eruptive stage, and therefore a sequel to the completion thereof through these emunctories—the kidneys? From whichever point of view we study these symptoms, the condition of the kidneys is that of inflammatory congestion, and the impeded renal function demands the same remedial measures.

Of the many cases of hæmaturia and dropsy after scarlet fever that come under treatment, some have had the exanthematous fever most favorably, and its characteristic stages have been well marked, but during convalescence the patient has been incautiously exposed, and the proper precautions, with respect to clothing at that period, have been neglected. In these there is some show of probability that arrested cutaneous function may suffice to explain the sequelæ of dropsy and bloody urine. But, in the vast majority of cases, this secondary condition must be accepted as evidence of the imperfect elimination of the febrile poison during the antecedent exanthematous stage, arising either from the great intensity of the poison, or the incompleteness of the processes by which it is released from, or decomposed in the system.

The amount and duration of the hæmaturia, as a secondary affection after scarlet fever, is very variable. In some cases the renal hæmorrhage is abundant, and gives to the urine, for some consecutive days, a marked blood-red appearance; in others the presence of blood is scarcely recognised, except by a certain dusky appearance, as if a few grains of soot had been added to the urine. Nevertheless, whether the hæmorrhage be trifling or abundant, there is always, as the commencement of this supplemental stage, evidence of more or less febrile disturbance, clearly expressing the inflammatory nature of this secondary process. Anasarca of greater or less degree of the whole surface of the body, sometimes with, more often without, serous accumulations in the abdominal cavity, accompanies the hæmaturia. The pale, pasty, spanæmic aspect of the patient, with a puffy, œdematous state of the face, is also very expressive of this disorder.

Case I.—Such are the chief characteristics of the hæmaturia and dropsy, caused by the secondary renal affection following scarlet fever; and the case of John D—, ten years of age, admitted into Burdett ward, in August, 1855, illustrates, in a marked manner, these preliminary remarks. This child had scarlet fever the first week in August, and, from the mother's description, the eruptive stage was passed favorably, there being, however, troublesome sore-throat, with external swelling of the neck. By the 14th of August, however, he appears to have been quite well. A few days after, however, his face and eyelids were noticed to be swollen in the morning; and, on admission, the following symptoms were recorded:—The whole surface of the body was anasarcous, more evident in the face and hands and wrists, feet and ankles, than on the trunk; the abdomen was distended, dull on percussion at the flanks, and afforded evidence of fluid by succussion. The temperature of the skin was higher than natural; the pulse was small and frequent; the tongue pale and furred. The respiratory movements were not impeded, and the heart's sounds were natural. The urine which was passed soon after admission was of a dark blood-red colour, and highly albuminous. The sediment, which was very abundant, consisted exclusively of large-sized fibrinous blood-casts (Pl. I, fig. 1); there were also many free blood-corpuscles. The little patient complained much of thirst, and urgent aching pain across the loins. The lumbar spaces were painful on making deep pressure. He was ordered to be cupped from the loins, and to take the compound jalap powder; and a diaphoretic draught was given every four hours, and its action promoted by the child being clothed in flannel. The little fellow bore the cupping without flinching or crying. The purgative powder acted briskly and with advantage. Two days afterwards the swelling of the abdomen was greatly reduced, and the general anasarca had decreased. There was less heat of skin; the pulse was fuller and slower; there was abatement of the thirst; the tongue was clean, and there was a desire for food. But the urine was still charged with blood, and the microscopic appearance as on admission. The pain across the loins was not diminished. Brisk purging with the cream of tartar and jalap was continued, and by the end of the week a very manifest improvement was apparent. The urine began to augment in quantity so soon as the action of the purgative ceased; but blood was still present, although in diminished amount. He was dry cupped on the loins with considerable and immediate relief, the lumbar pain subsided, and the urine became clear and more natural in appearance. Its specific gravity was 1·016. By the tenth day from admission the dropsy of the surface had nearly disappeared. The abdomen was natural and free from any indication of fluid, and the only vestige of the anasarca was some slight puffiness of the eyelids in the morning. Drawings of the sediment were made from time to time; but no material alteration took place, till the hæmaturia subsided—when the casts appeared coarsely granular, entangling spheroidal epithelial cells and a few isolated blood-discs. (Pl. I, fig. 2.) These epithelial casts continued present so long as any dropsical symptoms remained. One or two isolated granule cells (fig. 2) were seen on one occasion only. In these cases of dropsy after scarlet fever the microscope at first reveals a state of simple renal hæmorrhage, the casts being the blood coagulated within the renal tubes and washed therefrom by the urinary current. Within certain limits, experience justifies the opinion that the more abundant the hæmorrhage, the greater is the security from subsequent renal disorganization. As the hæmorrhage subsides, an exudation of epithelium takes place, held together in the form of casts by a coarsely granular material, which is doubtless an inflammatory product, as it is frequently accompanied by inflammatory corpuscles—granule-cells and amorphous fibrinous flakes. In this case, however, the evidence of the severer form of inflammatory action was wanting, for the granular epithelial casts contained only spheroidal epithelial cells, exhibiting no departure from the standard of healthy cells. The casts became daily less granular, and ultimately perfectly hyaline or transparent, with here and there an epithelial cell, either within the cast, or isolated and scattered over the field of the glass.

By the fourteenth day very evident improvement had been effected: all traces of dropsy had disappeared; the appetite was good; the quantity of urine was natural, but it was still albuminous. There is, however, in these cases an impoverished state of the blood which tells so forcibly of the morbid agencies, which, from the primary exanthematous fever to the secondary febrile state with renal hæmorrhage, so continuously deteriorate this fluid in its most important constituent of red corpuscles, that the propriety—nay, the necessity for the administration of chalybeate remedies must ever be apparent. The citrate of iron was at first given; but the urine continuing albuminous, and the microscope occasionally revealing isolated blood-discs and granular cysts, it was changed for the tincture of the sesquichloride. It was remarked how rapidly the child improved in appearance; how soon, after taking this most valuable of all the preparations of iron, his face, and the surface of the body generally, indicated a return to the characteristics of a healthy circulation. Before he left the hospital we had the satisfaction of finding the urine quite free from albumen, and that, beyond a few isolated and scattered epithelial cells, the microscope detected no morbid conditions in this fluid. Valuable as the preparations of iron are in the treatment of these cases, judgment is required in selecting the proper period to administer them. Our best guide is, the presence or absence of febrile disturbance; so long as the patient suffers thirst, anorexia, and has a quick pulse and hot skin, febrifuge and antimonial medicines, with local depletion, are obviously indicated; but, with the subsidence of these symptoms, ferruginous preparations should be given without loss of time. I believe the sesquichloride of iron, in these cases, to be the most efficacious and the best adapted for this class of disorders. This case has illustrated the chief features of the hæmaturia and dropsy after scarlet fever,—they may be summed up as follows: Secondary febrile disturbance; anasarca of the surface of the body; ascites; extreme pallor, or even waxlike aspect of the skin; scanty, albuminous urine; and renal hæmorrhage. The urinary deposits were very characteristic. At the first examination fibrinous casts (Pl. I, fig. 1), entangling numerous blood-discs; amorphous flakes, which, like the casts, were coloured by the hæmatin; free blood-corpuscles, with a few epithelial cells. As the hæmorrhagic state of the urine subsided, the casts presented the appearance of tubes somewhat granular, containing the epithelial cells of the tubes—several isolated, large and oval; some few spheroidal (Pl. I, fig. 2); and here and there appeared a compound granule-cell. At a later period the tube-casts became almost transparent, and contained only here and there an epithelial cell, the urine had become free from albumen, and the patient was pronounced convalescent.

The principles of treatment applicable to such and similar cases may be comprehended in a few words. To lessen the febrile disturbance, to promote the action of the skin, to alleviate the local congestion of the kidneys, and while the hyperæmic condition of these organs continued, to husband their powers of excretion, and by active purgatives to cleanse the system of the accumulated fluid which the embarrassed kidneys were unable to excrete. When these results had been favorably accomplished, the indications were to supply the functions of assimilation with a constituent all important to the impoverished blood, and which, co-operating with animal food and a well regulated diet, soon brought the little patient to a satisfactory convalescence.

In this case little alteration of cell-structure was visible. A few compound granule-cells, ever present when epithelial surfaces have been the seat of inflammatory action were the only forms detected. No free nuclei, or clustered nuclei, or other indications of breaking up of cells, were noticed.

## RELATION OF SCARLET FEVER TO RENAL DEGENERATION.

*Hæmaturia after scarlet fever—General dropsy—Pulmonary and cerebral complications—Convulsions—Death.*

The secondary diseases of scarlet fever, the renal congestion, the dropsy, the albuminous and bloody urine, and the oftentimes fatal termination, are to be traced to the imperfect elimination of the original febrile poison. On the kidneys the force of this secondary effort seems concentrated. In mild cases, a state of simple congestion, with temporary embarrassment to the renal function, is alone evident; the dropsy is but trifling; the urine soon recovers its natural character, and convalescence speedily follows. But in the severer forms, either from the intensity of the febrile poison or the weak or scrofulous habit of body which it attacks, the hyperæmia of the kidneys becomes an inflammatory engorgement, and destructive processes follow, terminating in exudation and fatal degeneration of the renal structures. The state of the kidney after death leaves no doubt on my mind that the consequences of this renal inflammation are identical with what we witness in the acute form of morbus Brightii. The symptoms during life—the general dropsy, the albuminous urine, the sediment, at first consisting of blood-casts, then fibrinous and epithelial, then presenting disintegrated, abortive, and fatty cells; after death, the pale, smooth, or finely granular, bloodless kidney, increased in weight from exudation both interstitial and tubular—afford convincing evidence of the analogy, not to say identity, of the morbid process active here and that observed in the acute form of morbus Brightii. Moreover, the complications of this secondary state are analogous. The cerebral and pulmonary conditions are not different; convulsions, coma, and death significant of uræmic poisoning occur in both. Pulmonary œdema is as frequently fatal in the one as in the other.

CASE II.—Richard L—, æt. 7, was admitted on February 10th, 1854. More than a month had elapsed since the child had suffered scarlet fever. He had been treated as an out-patient for a few days preceding admission. His convalescence after the primary fever did not progress favorably. The mother, however, could give no very intelligible account, except that he suddenly began to swell all over about a week since.

The child was the subject of general anasarca. The face was pallid, pasty, and sodden. The scrotum was distended with fluid and the prepuce œdematous; there was serous effusion of moderate extent into the cavity of the abdomen. The chest was moderately resonant; moist mucous murmurs were heard in all the large tubes. The respirations were frequent and short, 24; there were fits of dyspnœa, and troublesome cough. The skin was of a febrile temperature; the pulse was 96. The heart's sounds were natural. The tongue was furred and dry, and there was much thirst. The urine was scanty, smoky in appearance, sp. gr. 1·020, and highly albuminous. The mother stated that for several days in the previous week the water was of a blood-red colour. Examined by the microscope, blood-casts of large size, with many free-blood corpuscles and some isolated epithelial cells, were visible. (Pl. I, fig. 3.) The compound jalap powder was given daily as a purgative. Warm baths and diaphoretic salines were ordered. The free purging and the febrifuge medicine reduced the febrile symptoms, and on the 13th, the skin had become cool, the tongue cleaner and moist, and there was less thirst. The face continued puffy, but there was considerable diminution in the general anasarca. By the 20th, ten days after admission, the urine had increased in quantity, was clear, of a bright amber colour. But the specific gravity had varied from day to day, according to the activity of the purgatives. The apparent amount of albumen was not reduced. The urinary deposit examined on the 12th day after admission was seen to consist of granular casts, containing epithelial cells; many compound granule-cells, some granular casts, containing free nuclei. On the addition of nitric acid, the albumen, coagulated by heat, became altered in colour, first assuming a bluish green and subsequently passing into a greenish black. The effect of nitric acid on the albuminous coagula results probably from the oxydizing agency of the nitric acid on the colouring matter of the urine; it has not yet, however, been satisfactorily explained: it occurs most frequently in the acute form of morbus Brightii, and, so far as my experience teaches me, it is a condition of very unfavorable significance. The pulse continuing good, and the appetite improving, the bowels acting freely with the cream of tartar purgative, the patient was placed on the potassio-tartrate of iron.

On the 3rd of March, three weeks after admission, the general aspect had improved, the face, however, continuing œdematous in the morning, but subsiding as the day advanced; the quantity of urine passed in the twenty-four hours had notably increased, but without any proportionate diminution in the general dropsy, which, although much less than the week previous, still manifested itself as anasarca of the entire surface. The specific gravity of the urine was 1·015-16, and the quantity of albumen seemed on the increase, as its coagulation by heat rendered the contents of the tube nearly solid. The urinary deposit examined under the microscope revealed alterations in the appearance of the tube-casts, which I have since learnt to view as significant of the most unfavorable results. The casts were still granular, and contained epithelial cells, presenting the usual appearance of the tubes during the early period, but many and by far the greater number of the casts were less granular, more transparent, contained here and there epithelial cells, some compound cells, and many free nuclei. Scarcely a cast was free from those larger aggregations of nuclei, to which the term glomerulus has been applied; whether they be abortive cells, of the nature of the so-called inflammation-globules of Gluge, when they appear in any abundance in any form of cast found in albuminous urine, and are accompanied by grape-like clusters of nuclei without a cell-wall (Pl. I, figs. 4 and 5), as well as by many others which are isolated and free, and appear imbedded in the granular tube-casts, they imply a very tumultuous action and a very intractable form of renal disease.

On this 3rd day of March the child was sitting up in bed, having taken his dinner with an apparently improved appetite, when convulsions suddenly came on; they were of the type of those intermittent movements so frequently seen produced by dental or intestinal irritation. These convulsive movements continued for several hours, with only slight intermissions; the pupils were dilated; the breathing was laboured and quick; the pulse 110—120; deglutition was impeded. Purgative enemata were administered; cold was applied to the head. The convulsions continued in paroxysms during the night; in the intervals the patient remained comatose. The child died at 2 p.m. on the morning of the 5th, forty-eight hours after commencement of the convulsions.

The kidneys were large for the age, and weighed six and a half and six and three quarters ounces. They were pale, flabby, and of a whitish-yellow colour. The capsule was easily removed and the surface was smooth, with a few arborescent veins. The cortical portion on a section was much increased in thickness, and the cones, which were of a pale salmon tint, seemed imbedded in it. A portion of the cortex was microscopically examined, and the Malpighian bodies seemed filled with a dense granular or molecular deposit, in which could be seen many free nuclei. The epithelial cells were in many places detached from the basement membrane, and the tube was filled with granular exudation; some compound cells and clusters of nuclei were also noticed. (Pl. I, fig. 6.)

The lungs were œdematous. Some fluid was in the abdomen. The brain had a sodden appearance. The ventricles contained serous fluid, but no other morbid condition was observed.

We could obtain no information which could be considered satisfactory of the earlier stages of this child's illness, beyond the fact of its having had scarlet fever. Whether the eruptive period was distinguished by any untoward symptom, or whether desquamation of the cuticle followed, could not be ascertained, as the mother had not paid attention to these matters.

That the secondary affection was characterised by symptoms of unusual severity, the state of the child on admission very plainly testified, and the attention of the student in clinical medicine is particularly directed—first to the degree and character of the febrile disturbance; secondly, to the renal and pulmonary complication; thirdly, to the cerebral conditions and sequel. The febrile symptoms were of a low type, yet there were many expressive of irritative action, such as usually accompany local or regional inflammation; nevertheless, the brown, dry tongue, the extent of dropsy, the pallor and wax-like aspect, forbade depletory measures. But the state of the urine, the physical signs within the chest, each told of states of stasis and hyperæmia in these regions—formidable obstructions to the purification of the blood by respiration on the one hand, and of its depuration by urinary excretion on the other. What principle of treatment should guide us in such complex states?

The therapeutical principle which I would enunciate is, to endeavour to act upon and bring into activity those functions and emunctories which are not, or are only in a moderate degree, implicated in the morbid disturbance; and by their agency relieve, if possible, the oppressed and impeded organs. Thus, though the surface of the body is anasarcous, we must endeavour to promote its exhaling power. Ammoniacal diaphoretics are adapted for this purpose. As the intestinal mucous surface gives no sign of sharing in the congested condition of the lungs or kidneys, we must excite its secretions to activity, and by purging the system of the accumulated fluid, vicariously, for a time, relieve the kidneys of their office. The intimate sympathy between the kidneys and the skin, and between the latter and the bronchial mucous membrane, entitles us to expect the most beneficial results from vigorously promoting the cutaneous function. Unhappily in these cases, the general anasarca of the surface is a formidable obstacle to cutaneous exhalation. External heat affords the most efficient aid. Warm baths afford oftentimes great temporary relief to the bronchial congestion and dyspnœa; the breathing becomes less oppressed, and the secretion from the bronchial tubes more free. But the hot-air bath is certainly the most efficacious; it is not followed by that exhaustion which a succession of warm-water baths invariably induce; and to my observation the amount of relief felt by the patient is much greater. To aid these external appliances, ammoniacal salines may be given internally with advantage. Active purging yields the best results. It is, however, of importance to select appropriate means to obtain the greatest amount of relief, for it is not every purgative of the Pharmacopœia which answers this purpose equally well. That purgative which acts most directly as a hydrogogue is the best adapted, but which, at the same time, is not followed by any disproportioned exhaustion, or by any torpid reaction. The combination of jalap and cream of tartar is most admirably suited to these ends. It acts quickly, without depressing the system, is not followed by inactivity, and induces copious watery dejections. This patient was much benefited by these purgative remedies; the febrile state was lessened, the tongue became moist, and doubtless, from the amount of fluid drawn away by the cathartic, may be explained the great variation in the specific gravity of the urine. There was manifest abatement of the dropsical condition, and the breathing was easier and the expectoration more copious. Continuing this plan of treatment, the improvement became sufficiently pronounced to justify the administration of chalybeates. At the same time, the state of the urine, revealed by the microscope, together with the appearance of that peculiar pigmentary condition observed in combination with the albumen, suggested a very unfavorable prognosis. The casts of the tubes were partly transparent, partly granular; many disintegrated cells were imbedded in them. A few epithelial cells were visible within the tubes, some were filled with fat-granules, and the tubes contained many scattered free nuclei, highly refractive, and completely removed by ether. These microscopic conditions indicated an advancing stage of degeneration, and if spread through both kidneys, must be quickly followed by an imperfect elimination of the chief urinary constituents.

It would be out of place here to enter into an investigation of the nature of the pigments that are occasionally met with in the urine, cyanurin, melanurin, &c. Experience tells me that the development of this pigmentary condition, in combination with albumen in the urine, is of the gravest import. It is always associated with the most advanced stage of renal degeneration, and in every instance in which I have seen it, it has been quickly followed by fatal results. Lehmann, in his 'Physiological Chemistry' (vol. ii, p. 428), says, as far as his experience goes, it is only when uræmic symptoms have manifested themselves, that this peculiarity of the urine is generally observable, and this entirely coincides with my own; or, I should rather say, that uræmic symptoms always follow or are associated with this change in the colour by nitric acid. We should not then be unprepared for the development of unfavorable symptoms whenever this peculiarity of the urine is observed; so that notwithstanding the apparent improvement in the child's condition, even to the diminution of the dropsy of the surface, I expressed my fears at the time that this hopeful state would be but temporary. And surely nothing can exhibit the value and importance of frequent examination of the urine in such cases more forcibly than the fact here obtained, and the unfavorable inference deduced, from the alteration in the cell-structure and this pigmentary phenomenon. In all other respects there was an apparent amendment, and if we had based the prognosis only on the general aspect of the patient, we might fairly have inferred that all was going on well. It is not of less importance in hospital practice than in private, nor is it less necessary amongst the poor than amongst the rich, to be explicit and candid in the expression of our fears or hopes to those anxiously interested in the welfare of the patient. It is as much the office of the physician to allay anxiety where that can be done with prudence, as it is his more distressing but not less imperative duty to disclose his worst apprehensions, especially when he sees expectations of amendment cherished, which experience teaches him will be but temporary, and which must soon give way to less equivocal signs of approaching danger.

In the present instance, I believe the warning given to the mother was unheeded; the amendment was so palpable to her, that she would not believe but that our unfavorable opinion was mere conjecture. An important point may be learnt here —namely, the suddenness and abruptness with which the symptoms of uræmic poisoning oftentimes commence. In some cases, particularly in adults, the indications are progressive; but here, all other things being promising, convulsions suddenly supervene; they intermit, but coma characterises their remission, and the patient dies forty hours after the first indication of the urinous poison acting on the nervous centre. It may very properly be asked—can nothing be done in this critical state of things? Are there no remedies available for such a crisis? With such a state of kidney degeneration as the latter examinations of the urine revealed, I believe nothing will avert the fatal termination. These cases of convulsion are not always immediately fatal; in the intervals consciousness may return, and advantage of that interval may be taken to administer medicinal aid. Where remissions of the convulsions occur of several hours' duration, a fairer prospect of relief is present than where the patient remains comatose. In either case, however, an effort should be made to excite the bowels to active exertion. Enemata, containing, according to the age of the patient, a quarter, a half, or even a drop of croton oil, should be administerered; and where the ability to swallow is unimpaired, benefit may be expected from the chlorine mixture, the agency of which, according to the opinion of Frerichs, depends on its decomposing the carbonate of ammonia into which the urea in the blood is converted, and which carbonate that author conceives to be the poisonous agent in these cases of fatal uræmic poisoning. Proofs of this doctrine are, I think, required; but whether the hypothesis be true or false, clinical experience pronounces in favour of this chlorine mixture in cases where symptoms of uræmic poisoning are developed.

The cell-structures, as well as the tube-casts, underwent the successive changes which have been observed in acute morbus Brightii, and I have no hesitation in placing scarlet fever in certain constitutions as one of the most active causes of this form of renal disease.

*Hæmaturia after scarlet fever—anasarca—convulsions—fibrinous casts during the hæmorrhagic period—epithelial casts later, few in number—recovery.*

Blood in the urine, general dropsy, and convulsions, are a formidable series of symptoms to combat against: but convulsions concurrent with hæmaturia and dropsy, though of the gravest import, are not necessarily fatal, and the following case teaches that complete, even rapid recovery may take place if the kidneys be not implicated beyond the stage of hyperæmia.

Case III.—William Grice, æt. 13, a potter's boy, was admitted March 31st, 1856. The surface of the body was everywhere anasarcous, the face œdematous, the respirations were not more frequent than natural, there was neither cough nor dyspnœa, the tongue was clean and pale, and there was no febrile heat of skin; pulse natural; the urine was scanty and of a dark sooty appearance. It was stated that ten days since he had sore throat and a mild attack of scarlet fever; he was ill in bed for a week, when the skin began to peel off his wrists and hands. He went abroad that day, and at night felt chilly, as if he had caught cold. In the morning his face was swollen, and subsequently his arms, wrists, and legs began to swell. His water was like blood. The boy complained of aching across his loins. On admission the skin was freely desquamating from the palms of the hands and soles of the feet. The urine was highly albuminous. He was cupped from the loins; had cream of tartar purgatives and diaphoretic salines. The urinary deposit exhibited under the microscope many blood-discs, much fibrinous débris stained with hæmatin, and many fibrinous casts containing blood-discs, and some free glandular epithelium, natural in appearance. (Pl. I, fig. 7.) The day after admission he was seized with convulsions. Mr. Wallis, the clinical assistant, described them as epileptiform in character, consisting of intermittent clonic movements, with some foaming at the mouth and snapping of the jaws; the pupils were dilated, and there was considerable turgescence of the face. There was rotation of the head on its axis. There was complete unconsciousness throughout. The spasmodic movements gradually subsided, and the boy fell into a calm and natural sleep of some hours' duration, on awaking from which he had no recollection of anything that had occurred. The tongue was not bitten. The urine became much augmented in quantity, clearer, and less albuminous. Four days after admission the anasarcous state of the surface had greatly subsided, yet the urine still presented a sooty, dingy appearance, but was plentiful in quantity. On the eighth day from admission the dropsy had disappeared, the urine, however, continuing albuminous, and exhibiting under the microscope a few isolated blood-corpuscles. Suddenly the hæmaturia returned. The urine became of a bright red, and fibrinous blood-casts, mixed with granular epithelial casts, were again present. (Fig. 9.) Amorphous fibrinous flakes, stained with hæmatin, were also seen. As the hæmorrhage subsided, epithelial cells, isolated or in groups, became apparent, as well as the granular epithelial casts. One or two compound granule-cells were seen, but there was no evidence of disintegrated cell-structure, no grape-like clusters of nuclei, nor anything to imply any tendency to cell-disorganization. He was now placed on the tincture of the sesquichloride of iron. In four days the urine regained its natural colour, it was slightly albuminous, and contained casts becoming daily less granular, with a decreasing number of epithelial cells. I was at first disposed to view the second attack of hæmaturia with apprehension; but experience teaches me that within certain limits the renal hæmorrhage is a salutary rather than a hazardous process. It is the natural and spontaneous relief to that state of inflammatory engorgement, which, if unrelieved, terminates in the production and exudation of materials, fatty, granular, and albuminous, which constitue the essentials of morbus Brightii. The deposits from the urine, as this hæmorrhagic condition subsided, gave assurance that nothing beyond the hæmaturia had occurred. There were no indications of any altered condition of the epithelium, and little more than the fibrinous débris, mixed here and there with a few epithelial cells, were noticed up to the period of his convalescence.

This case exhibits the reliance which may be placed on the character of the urinary deposits, as a guide for arriving at a correct opinion of the nature and probable termination of the renal disorder.

If the absence from the urine of all indication of any morbid change in the appearance of the epithelium, notwithstanding the continual presence of albumen and the elements of hæmorrhage, be taken into consideration, and compared with the changes which those cells exhibited in the fatal case of R. L., represented in Pl. I, figs. 4, 5, and again in that of Hadway (Pl. II, fig. 2), it is but a reasonable inference, that so long as the epithelium undergoes no morbid change, and is unaccompanied by compound cells (Gluge's), or other evidence of fatty or granular exudation, the safety of the patient may be held secure; but such alterations in the character of the deposit, following rapidly in succession the proofs of inflammatory engorgement, which an early examination of the urine has supplied, must be accepted as significant of imminent, and, perhaps, I may say, certain danger.

The microscopic examination of the urine, therefore, justified a favorable prognosis; for at no period did the instrument reveal any disorganizing process going forward in the epithelial structures—nothing was seen but normal cells entangled in the fibrinous coagula, blood-discs, and amorphous fibrinous flakes. In this respect how different from the character of the deposit in the fatal cases to which reference has been made. We may thus reasonably conclude, that where the urine affords no evidence of any destructive disintegration going forward, a safe and speedy convalescence may be expected. Yet it must not be forgotten, that so long as the urine continues albuminous or exhibits any trace of the hæmorrhagic state, active treatment should not be neglected nor measures of precaution laid aside. There seems to be a special efficacy possessed by the tincture of the sesquichloride of iron in such cases of renal hæmorrhage; and it appears materially to aid nutrition in rapidly restoring to the circulation the proportion of red corpuscles, the destruction and loss of which is so apparent in these forms of disease; and it appears to me also to exercise, either directly or indirectly, some beneficial influence in the formation of healthier cell-structure. It is possible that whatever restores to the blood any property or quality in which it is deficient, imparts to the organism a renewed power in the development of cells. There is no greater or more striking effect seen than the gradual disappearance of abortive or disintegrated cells in the urinary deposit, as the patient slowly comes under the influence of these preparations of iron.

### *Hæmaturia after scarlet fever—anasarca—convalescence.*

I have already alluded to a point of much pathological interest arising out of the investigation of these cases of hæmaturia and renal disturbance: whether this sequel simply arises from the arrest of the cutaneous function during the period of the desquamation of the cuticle, or whether it may not be traced to the imperfect elimination of the febrile poison at the exanthematous period, and referable therefore to a state of the blood imperfectly purified.

Case IV.—The case of Ralph W., æt. 11, bears materially on these points, for he was in the hospital throughout both stages of the fever; indeed the fever showed itself while the patient was in the surgeons' ward, and he passed into Burdett ward on the first appearance of the febrile symptoms. He was admitted November 13th. He complained the night before of feeling ill, and early in the morning of the 13th he was seized with violent retching, vomiting, and purging. The tongue of a bright red and moist, and the papillæ being much enlarged. He vomited frequently during the day, and complained of pinching pain in the abdomen. The pulse was small and weak. The case was thought to be one of simple gastric disturbance, and he had effervescing medicine and some aromatic mixture.

On the 15th, two days after the first symptoms, there was sore-throat, the fauces and tonsils having the brilliant scarlet redness characteristic of the scarlet fever, and the tongue had acquired the well-known strawberry aspect. In the course of the day a bright efflorescent rash appeared on the face and throat, extending thence to the trunk, and during the following days occupying the whole body and extremities. The irritable state of the stomach and bowels ceased with the appearance of the eruption. He was placed on the chlorate of potash mixture.

On the third day of the eruption the colour had become dusky, and there was no diminution of the sore-throat; on the contrary, there was disposition to ulceration, with the formation of a dirty, tenacious, viscid secretion. The throat was cleansed frequently by means of a sponge saturated in the chlorine mixture.

On the 21st of November the eruption had entirely disappeared, and the throat presented a favorable appearance, but there was no appearance of desquamation of the cuticle.

On the 23rd, the eighth day of the fever, slight cuticular exfoliation appeared on the arms, but no further appearance of desquamation was observable. His convalescence progressed very slowly. The appetite continued indifferent; the tongue had become pale; the aspect of the patient was dull; the bowels acted regularly, and the urine was abundant and natural. The patient during this period was placed on bark and nitric acid, and the diet was improved; but there was no inclination for food; the little fellow was lethargic and dull, and indifferent to everything about him, and had no inclination to get up. There was no cough; the respiratory sounds were natural, and with the exception of the signs of a tardy convalescence and defective appetite, there were no symptoms of consequence.

On the 7th of December, twenty-two days after the first appearance of the scarlet rash, the surface of the body became generally anasarcous; there was some heat of skin and acceleration of pulse; the tongue was pale and moist; the face was œdematous, as well as the trunk and extremities, but there was no ascites. He complained of aching pain across the loins, and the urine was scanty and highly charged with blood. The breathing was somewhat oppressed and short; there was frequent cough, without expectoration; the respiratory sounds were very faint throughout the chest, and in the large tubes there was some trifling sibilus. He was cupped to four ounces from the loins. Ordered the compound jalap powder, one scruple, and the diaphoretic mixture; to be clothed in flannel, and a hot-air bath administered. The urine was microscopically examined, and fibrinous casts entangling blood-discs were abundantly visible, together with free blood-corpuscles. (Pl. I, fig. 10.) The treatment made little impression on these symptoms for the first six days; throughout this period the hæmaturia continued and the anasarca increased, so that both upper and lower extremities became extensively œdematous. He had warm baths and brisk purgatives, with the compound jalap powder.

On the 20th of December the urine became more abundant, had lost the red, sanguineous character, and had acquired the smoky tinge observable in the milder forms of scarlatinal dropsy; it was moderately albuminous. The microscope exhibited tubular casts; more transparent, and containing a few blood-discs, with granular epithelial cells, and one or two compound granule-cells. (Fig. 11.) The tincture of the sesquichloride of iron was now given. The anasarca gradually disappeared; the urine became clear and natural, and when examined, on the 4th of January, was free from all appearances but a few very transparent casts, with here and there an epithelial cell and isolated nuclei. (Fig. 12.) The patient rapidly improved, soon lost the flabby, sodden aspect of dropsy, and was discharged convalescent.

This case teaches us, that no precaution taken during the period immediately subsequent to the exanthematous fever can avert the morbid sequelæ in certain instances. The child never left the ward from the first day of the attack. The temperature of the ward is uniform, never descending below 60°. The type of the fever was that of scarlatina anginosa. The ushering in of the disorder was more than usually severe, the vomiting and purging of the days preceding the eruption being disproportionately frequent. The eruption exhibited in its course nothing irregular; it perhaps may be said to have receded too early. The sore-throat was not more severe than in analogous cases. The irritable state of the stomach and bowels departed so soon as the eruption came out. On the whole, however, it was very evident that the type of the fever was of the severest form, excepting only that dreadful form, the scarlatina maligna; and, moreover, that the exanthematous period had not adequately eliminated the febrile virus. This became apparent at the period of desquamation, which, in ordinary cases, proceeds *pari passu* with convalescence; but a trifling exfoliation of cuticle took place, and the progress of recovery lingered, as though some morbid material still lurked in the system; nor can we doubt that it was so, for secondary febrile symptoms manifested themselves, accompanied by hæmaturia and general dropsy: congestion of the respiratory organs, expressed by cough and dyspnœa, were also amongst the disturbances indicative of some widely-acting morbid influence. The hæmaturia was severe, and continued unaffected by the measures employed for the lessening of the local and internal congestions. Cupping, active purging, diaphoretics, and warm baths were administered, but the hæmaturia continued unabated for seven or eight days, and then, apparently having accomplished the complete depuration of the system, it subsided, leaving no other morbid condition to be combated but the impoverished blood and the accompanying debility.

It is interesting to observe how rapid is the restoration to health, how speedily ferruginous preparations seem to enrich the blood with red corpuscles, so soon as this cleansing process of the secondary fever has become complete. The hæmaturia in these cases, when severe, would seem to threaten the organic integrity of the renal organs; but, if careful microscopic examination be made from time to time, and the character of the casts carefully noted, these will be seen as fibrinous moulds of the larger tubes, containing blood-discs, and scattered epithelial cells. As anasarca diminishes, epithelium becomes less abundant, and gradually disappears as convalescence progresses; the albumen, at the same time, daily diminishes, till, at length, all vestiges of it are lost, and the urine exhibits all the qualities of the healthy excretion. It is when the desquamation of the renal epithelium does not diminish, the urine continuing albuminous for weeks after the secondary attack, the specific gravity of this fluid becoming low, the urinary constituents reduced to a minimum, the casts becoming more and more transparent and fatty, the epithelium becoming more abortive, with scattered or grouped nuclei; it is under such circumstances as these that an unfavorable prognosis must be formed, and fears entertained that permanent granular degeneration of the kidneys has commenced.

The strong resemblance which exists between the dropsy after scarlet fever and albuminuria has been already noticed. So great, indeed, is the resemblance, that they may be said to differ in nothing but the cause; the scarlatinal poison being the exciting cause in the one, cold and wet acting on unhealthy blood in the other. The effects are the same in both, and the anatomical condition of the kidneys so similar, that we are justified in adopting the opinion of Rokitansky, that the scarlet fever poison is one of the most efficient agents in producing morbus Brightii. The following case illustrates these views:

Case V.—J. Hadway, æt. 6, admitted December 28th, 1857. He was the subject of general anasarca fourteen days after the disappearance of a trifling and imperfect scarlatinal rash. The face was puffed and the eyelids œdematous, and the serous infiltration extended to the back of the hands. The lower extremities were far less dropsical than the upper; the cuticle on the legs and thighs was imperfectly desquamating; the breathing was short and hurried. The urine was somewhat turbid, throwing down, at rest in a tube glass, a coarse, flocculent, reddish-coloured deposit. The supernatant urine had neither the blood-tinged colour of recent hæmaturia, nor the smoky hue so often observed in the urine after scarlet fever; it was of a dirty, faint straw-green; it was highly albuminous, more than half the tube being filled with the coagulum. The microscope showed a most abundant deposit of various casts—some fibrinous, containing nothing but blood-discs (Pl. II, fig. 1), some containing both blood-discs and epithelial cells. There were also many of the larger polygonal cells of the straight tubes held together by granular exudation, as if in twos and threes they had been thrown off from the basement membrane and carried with the tube-casts into the urine. There were also many free blood-corpuscles.

The treatment was by purgatives, antimonials, and warm baths, and by the surface being clothed in flannel. But little impression was made on the dropsy.

On the 7th of January, 1858, the urine presented the same albuminous condition, but with marked alteration in the character of the microscopic deposit. Scarcely a blood-disc was visible, the casts were entirely free from them. There were many fibrinous cylinders, of a fine granular appearance; there were others which contained numerous resplendent granules, evidenly of free nuclei, several broken-up glomeruli, the integral parts of which, perhaps, were entangled in these fibrinous cylinders. There were larger tube-casts, highly granular, containing numerous epithelial cells. Some abortive epithelial cells, as well as free fat-cells, were also present. (Pl. II, fig. 2.) I could not view this change in the character of the deposit without expressing my fears that very grave conditions of the kidney were present, and that the issue of the case would be unfavorable. The finely granular casts containing free nuclei, the broken-up glomeruli, the fatty condition of the casts containing epithelial cells, spoke with emphasis of the rapid change in the textural condition of the kidney, which must be progressing with a fatal intensity. The anasarca rapidly increased, the œdema of the face nearly obliterated the features, the breathing became short and gasping, and the poor little patient succumbed under symptoms of œdema pulmonum on the evening of the 9th of January.

The kidneys were large for the age. They weighed severally four and three quarters and four and a half ounces. They were lobulated, marked on the cortical surface, which was very finely granular when the capsule was removed, with numerous asteroid vascular spots. The colour was a pale fawn. A section displayed the cones of a deep red with strongly marked vascular striæ, surrounded by and apparently imbedded in the light coloured granular deposit. A milky fluid was easily pressed out from the apex of the cones, and it exhibited long lines of polygonal cells, with the epithelium of the straight tubes agglutinated together; a few compound fat-cells were visible, and several disintegrated glomeruli. The whole field was moreover covered with a fine granular matter freely moving about in the fluid. (Pl. II, fig. 3.) The appearance of the cortical portion when teazed out with needles, is represented in fig. 4. A Malpighian body and some convoluted tubes are seen blocked up and filled with a fine granular-looking exudation. In places, the epithelium seems detached from the basement membrane, and its place filled with granular and fatty material. Disintegrated glomeruli, abortive epithelial cells, and free nuclei, are dispersed about the field, together with an abundance of fine granular material.

The straight tubular structure at the base of one of the cones was torn out with needles, with a view of isolating some of the tubes. At the part where one of these was isolated, the basement membrane appeared naked and deprived of epithelial lining from the readiness with which the cells were detached when the tube was set free. The upper part of the tubes seemed blocked up with a granular exudation, in which the epithelial cells appeared impacted. Some free fat-cells were seen in the exudation. (Pl. II, fig. 5.)

This condition of the kidney is identical with one form of morbus Brightii, and represents the acute form of the disease. It illustrates the inflammatory origin of renal degeneration, as well as the share which a contaminated or vitiated blood has in producing this disease, and it confirms an opinion formerly expressed, that the scarlatinal poison must be reckoned one of the most active causes of an inflammatory state of the kidney, which rapidly terminates in an exudation both tubular and interstitial.

In some cases the nephritis is slight, and soon passes away; in others, it appears to be relieved by a free hæmaturia; in a third class, either from the idiosyncrasy of the patient, or the intensity of the febrile poison, and consequent inflammatory congestion of the organ, only partially or imperfectly relieved by hæmorrhage, the nephritis runs a rapid, tumultuous course; exudative products, abundantly formed, choke up the renal tubes, the cell structure is broken up, its place filled with a dense granular deposit; compression of, and obstruction to the renal circulation follows, for the organ becomes less capable of sustaining a free circulation as the product of exudation increases; a gradually increasing pallor of the cortical part follows; the obstructed tubes appear filled with abortive epithelial cells, granular matter, compound granule-cells, and disintegrated cells, the debris of which, in the form of isolated or irregularly collected fat-granules, give the note of warning, by their appearance in the urine, of the intensity and rapidity of the morbid process of degeneration. Close observation justifies me in averring, that whenever the granular and fatty cylinders, compound fat-cells, make their appearance in the urine (Pl. II, fig. 2), within a few days—six or seven—after microscopic evidence of hæmaturia; that is to say, when there has been no hæmorrhage from the kidneys visible to the unaided eye, and only faintly indicated by the casts containing blood-discs, and the few free blood-corpuscles in the urine seen through the microscope, there are then very grave reasons for inferring that a rapid and intractable disorder of the kidneys is hastening to a fatal termination. I would further observe, that it is not so much the abstract or special character of the deposit—not so much the mere fact of the presence of fibrinous cylinders containing free fat-grains, or of disintegrated compound granular cells or of abortive epithelium, as it is the period at which these appear in the urine. Now and then, at long intervals, in chronic cases, some of these are seen; rarely, if ever, occurring together. It is when they suddenly make their appearance, following almost immediately upon the period of inflammatory engorgement, that fears should be entertained that they bespeak a rapid and fatal progress.

The evidence afforded by this and analogous cases, from my point of view, places beyond doubt the inflammatory origin of morbus Brightii.

Case VI.—Two days after the death of the child Hadway, a female child, five years old, was admitted under the care of my colleague, Dr. Radcliffe, with general dropsy. The little patient was suffering when I saw her under the suffocative symptoms and restlessness of œdema pulmonum. The child had been ill about a fortnight; and the swelling commenced the week after an attack of scarlet fever. She was not brought to the hospital till *in extremis*.

The lungs were gorged with fluid. The whole surface of the body was anasarcous. The kidneys weighed four ounces and a quarter, and five ounces. They were pale, with a few scattered stellar spots of vascular injection. The capsule was adherent in places, and developed a slightly granular surface when removed. The cortical part of the kidneys was much augmented, was of a fawn colour, exhibiting the markings characteristic of engorgement of the Malpighian tufts, presenting strongly marked striæ of a deep red, perpendicular to the surface. The cones were of a natural colour, their bases well defined, and distinct from the cortical portion. The vascular portion of the cones was also injected, and presented striæ of heightened colour, running parallel to the straight tubes, and diverging from the apex to the base.

The post-mortem conditions of these kidneys did not differ from those in Hadway's case, and microscopically the appearances were the same as shown in Pl. II, fig. 4. The convoluted tubes were gorged with granular exudation. The basement membrane in places was denuded of cells, and replaced by granular matter and compound fat-cells. In places the tubes retained their natural appearance. The straight tubes were also gorged, and in places entirely deprived of epithelium.

If these cases be compared with that of Osborn and the microscopic condition of the kidneys in both cases be contrasted, a very strong family likeness will I think be found. The late Dr. Miller, ('Pathology of the Kidney in Scarlatina,' by James Miller, M.D., 1850) published a series of cases to illustrate the pathology of the kidney in scarlet fever. His conclusions are, that the state of the kidneys both before and after death, are the counterpart of one form of Bright's disease. Dr. George Johnson ('Medico-Chir. Trans.,' vol. xxix, p. 16) denies that scarlatina ever produces Bright's disease. Although in his work on the 'Diseases of the Kidney,' (pp. 121, 122), he mentions what he considers an exceptional case, where the patient suffered two attacks of scarlatina, the last of which terminated in fatty degeneration of the kidney. Rokitansky ('Pathological Anatomy,' vol. ii, p. 202), however, classes scarlet fever as one of the causes of Bright's disease, both in children and adults.

If the pale, bloodless, fawn-coloured, enlarged and sometimes slightly granular kidney, found in the majority of fatal cases of scarlatinal dropsy, be not an example of morbus Brightii, of what disease is it an example? In both there is exudation of a finely molecular material into the tubular as well as the interstitial portions of the organ. If the convoluted tubes, choked up with a molecular exudation and broken and abortive epithelium, be not an example of Bright's disease, of what disease is it an example? If the general dropsy, the pallid surface, the albuminous urine, with its epithelial casts, becoming fatty and granular, be not symptoms of Bright's disease, of what disease is it an example?

Till greater semeiological and anatomical distinctions can be shown to exist between the two, it is both more convenient and more consistent with scientific arrangements to bring this form of disease into the catalogue of those which Dr. Bright was the first to describe and illustrate, than hypothetically to assume a special process and a distinct form of disease.

Some English pathologists doubt whether a state of hyperæmia or inflammatory engorgement of the kidney is a constant or necessary preliminary to the development of morbus Brightii. Dr. George Johnson ('Medico-Chirurgical Transactions'), Dr. Handfield Jones ('Pathological Anatomy,' Jones and Sieveking, p. 596), and some others, think that hyperæmia or antecedent congestion is not a necessary element of the morbid process. A careful investigation of numerous cases of renal dropsy, both as regards the history of the early period, as well as of the evidence which a microscopic examination of the urine affords in the first stage of the acute form, induced me formerly to adopt the opinions of Frerichs, Rokitansky, and others, and to regard this disease as essentially the result of an inflammatory process, terminating in an exudation of inflammatory product, which, under the several forms of a granular, albuminous, or fatty deposit, gives to the kidneys various degrees of coarseness, according as the deposit is limited to the Malpighian bodies, or more diffusely spread through the convoluted tubes of the cortex: the coarsely granular kidney, with its roe-like granulations, representing the more limited deposit—the smooth, soft, enlarged, white kidney, representing the more diffuse deposit through the tubuli. I have since found reason to modify this opinion, that every case of morbus Brightii had its origin in a state of inflammatory engorgement. There are some forms of the disease in which a fatty and the so-called amyloid degeneration cannot be traced to such an origin.

We are ignorant of the causes of these differences. They appear to represent different degrees of intensity or duration: yet the large, pale, bloodless kidney, is often found in acute cases, as well as in chronic and protracted ones. (See the cases of Osborn and Eden, acute and chronic albuminuria.)

Great difference of opinion still prevails among pathologists as to the relation of these different states of the kidney with each other.

Some inquirers are inclined to view these variations as representing different morbid processes. But though the product differs in amount and diffusion, though its character varies in the proportion of fatty molecules it may contain, or the degree of disintegration the cell-structure may have suffered, whether the process terminates in a large, pale, bloodless kidney, or a coarsely granular, even tuberculated kidney, the commencement of the disorder is from a state of vascular embarrassment, well marked in some cases, though obscurely declared in others. Dr. Bright has always considered the incipient stage of the disease to be a state of congestion, followed by a deposit of granular matter, which ultimately renders this organ impermeable to blood, and produces the exsanguine pallor so characteristic of the disease in its more advanced degree.

Rokitansky ('Pathological Anatomy,' Sydenham Society ed., vol. ii, p. 199) unequivocally attributes the various forms to an inflammatory process. "We consider," he says, "the nature of Bright's disease to consist in an inflammatory process, which proceeds from a stage of hyperæmia to one of stasis, and then gives rise to a product, which is not only remarkable for its peculiar character, but which, in well-marked cases, by its excessive accumulation, causes a singular alteration in the appearance and structure of the kidney. It commonly runs a chronic course, with occasional exacerbations, but it is sometimes acute. In the latter very important cases, in which, from the tumultuous violence of the exudation, the product is mixed with a large amount of serum, and is generally reddened by the colouring matter of the blood, and in which the characteristic milky or creamy coagulated substance of well-marked Bright's disease is not formed, we should be obliged to consider the condition as one of very acute simple inflammation of the kidneys, were it not that the characteristic general symptoms and the constitution of the urine established it as a case of Bright's disease."

If the eye derived no assistance from the microscope, if our judgment was formed only from the external appearances and qualities of the kidneys, it would be difficult to conceive that the large, pale, soft, bloodless kidney, was the result of the same morbid process as the kidney with its roe-like granulations, its mottled and chequered surface, exceeding but little in weight the healthy kidney. Yet microscopic investigation tells us that they differ only in the degree and diffuseness of the exudation.

In reference to the morbid processes producing these various conditions of the kidney, it is not a little significant that the symptoms during life are in each, if not identical, yet possess so many features in common, that the character and progress of the dropsy, the morbid conditions and complications associated therewith, the albuminous state of the urine, and the usually fatal termination of the disease, are circumstances common to all forms except that of the nodulated, shrivelled, and contracted kidney; the pathology of which appears to differ from the rest, as do the symptoms during life. So that during the progress of the disease, one common principle of treatment is applicable to each variety. From the catalogue of symptoms ordinarily present, we cannot decide during life which form of renal degeneration is going forward. Dr. George Johnson has successfully shown that a microscopic examination of the urine will serve as a guide for discriminating between the large fatty kidney and the contracted nodular kidney, between what he calls acute desquamative and chronic desquamative nephritis, between the non-desquamative disease and the fatty and granular disease. As a pioneer in this direction of inquiry, he has done good service to the cause of renal pathology. But I venture to think that he has framed a nomenclature for different stages of the same disease, and that he has overlooked the fact that in a protracted and chronic case of morbus Brightii, there have been both the desquamative and non-desquamative periods. The urine showing granular-casts with epithelium at one period, then becoming less granular, with less epithelium, more transparent, and, perhaps, more fatty as the disease advances. In truth, every case of morbus Brightii exhibits a stage—often overlooked, and short though it be—in which more or less of the epithelium appears entangled in the granular-casts, and which Dr. Johnson would call either acute or chronic desquamative disease. As the disease progresses, little or no epithelium is visible, the cast becomes transparent, hyaline, or waxy, and this represents the non-desquamative disease of the above-named author. At the earlier period, when the casts are fibrinous or granular, with more or less of epithelial structure entangled therein, the disease is remediable and obedient to treatment. But in certain cases the disease commences with such violence, and runs so impetuous a course, that the most active measures are unavailing. Yet these cases of the acute forms of the disease, provided they do not die in the early period of inflammatory engorgement, exhibit, so far as the urinary sediment affords proof, examples of the acute desquamative, the chronic desquamative, and the non-desquamative periods of Dr. George Johnson. The case of Osborn is an example; the casts, at first fibrinous with blood-discs, then became granular, and filled with epithelial and compound cells; the epithelial cells then became less numerous, with many free nuclei and abortive cells; the casts lost their granular aspect, and became day by day more transparent, and free from epithelial structure, but abounding in collections of nuclei and aggregated fat-molecules. The appearance of epithelium in the casts in the acute period is the result of the inflammatory disturbance, a condition common to all mucous surfaces. The epithelium decreases from one of two causes—favorable and unfavorable. The first, in consequence of the gradual return to the equilibrium of healthy action, the subsidence of the disturbing cause—just as in catarrhal inflammations of other surfaces, as the balance of the circulation is restored, the epithelial exudation diminishes, and at last disappears. The second and unfavorable cause of the absence of epithelium depends chiefly on the disintegration of the cell-structure, and its retention in the uriniferous tubes; abortive cells and granular and fatty molecules are seen impacted together, closing up the canals and Malpighian bodies.

The tubes at the base of the pyramids are usually seen in a state of disease, intermediate between the convoluted tubes of the cortex and the straight tubes of the apex of the pyramids; for the degeneration invariably proceeds from without inwards, and it is probable that from this transition part the casts are derived which are found in the last and advanced periods of the disease.

Epidemic diseases scarcely differ more from each other than does the same epidemic disease differ in intensity and destructiveness at the various periods of its return.

This remark is specially applicable to scarlet fever. In some years all, or the majority of cases, exhibit mild and favorable symptoms. A slight febrile disturbance, with sore throat, is followed by a diffuse scarlet rash, which gradually pervades the whole body; and, fading on the sixth or seventh day, leaves the cuticle to desquamate, and the patient to a rapid convalescence. Of this simple form of the epidemic, Sydenham has truly said that it deserves little more than the name of a disease, and that the patient is in little danger, but through the officious zeal of the physician. But the characteristics of other epidemics of the malady are very different, and the present visitation (Jan., 1859), now of more than three months' duration, has been particularly illustrative of the prefatory remark; for the majority of the cases have presented unfavorable, not to say fatal symptoms, the mortality, according to the Registrar-General's Reports, having been greater than for some years. In the more malignant form of the disease, sore-throat is a very prominent symptom: and it may be doubted whether a great number of the fatal cases recorded as diphtheria have not been scarlatina anginosa, or scarlatina maligna. In the scarlatina anginosa, the sore-throat is the symptom which alone attracts attention; and if the peculiarities of the inflammation be not closely noted, an inattentive observer might view the throat disease as a simple tonsilitis, or be ready, when unfavorable symptoms followed, to classify it under the title of diphtheria.

In the true scarlatinal sore-throat, the tonsils, soft palate, uvula, and back of pharynx, are involved in a diffuse inflammatory redness of a brilliant hue; the tongue, partaking of this elevated colour, and oftentimes being furred, and the enlarged papillæ appearing through, the similitude to a strawberry has been imagined, and hence "strawberry tongue" has been accepted as the characteristic of this stage of scarlet fever. The throat, however, not only presents an inflammatory redness, but there is considerable tumefaction, sufficient to impede deglutition and speech, and, extending to the external parts, produces swelling of the sub-maxillary glands, and stiffness and painful distension of the integuments about the throat. Specks or points of ulceration make their appearance on the tonsils, and a viscid, tenacious mucus is formed, which adheres to the parts, and sensibly increases the difficulty of deglutition. This viscid secretion may be mistaken for the croupous pellicle which is formed in diphtheria; the specks of ulceration discoverable beneath this viscid mucus will, however, distinguish the scarlatinal from the diphtheritic inflammation. The eruption comes on late and imperfectly, and may be, and is, often overlooked. Within ten days or a fortnight, the urine becomes scanty, dark-coloured, and albuminous. In many, the presence of blood is unmistakable; in others, the urine acquires but a dirty or sooty appearance. This condition of the urine will, I believe, if any doubt remains, distinguish the scarlatinal from the diphtheritic disease. By some writers in the weekly medical journals the urine in diphtheria has been described as albuminous. But, with every respect for these communications, I should venture to classify the disease as scarlatina rather than diphtheria. It is this evidence of the disordered state of the renal organs which constitutes the element of danger in these cases, and which eventually leads to the development of the most unmanageable of all the forms of albuminuria—acute morbus Brightii.

It is a singular fact, that the activity of the renal disorder bears no proportion to the apparent intensity of the original febrile poison. For it may be said that inversely as the manifestation of the symptoms of scarlet fever, is the susceptibility to the renal disorder; for the more highly developed the scarlet rash, the more complete will be the proof of the elimination from the blood of the febrile poison; and the less characteristic the rash, the more certain that the poison lurks in the system, unheeded and undestroyed, and eventually to implicate the kidneys in a disorder fatal in proportion to the tardiness with which it is recognised. In this type of cases, the eruption is slow to show itself; and in place of a diffuse efflorescence, it occurs in patches, far less intense in colour than in the simpler and milder form of the disease, The constitutional disturbance is oftentimes great; but cases are frequently met with, where, ultimately, a fatal termination by renal disease takes place, in which the primary disorder was not marked by any symptoms of urgency. The patient appears to convalesce favorably, but, slowly and insidiously, evidence of lurking mischief becomes apparent. In some cases there may be symptoms of a secondary fever about the fourteenth day from the date of the sore-throat, some restlessness, loss of appetite, and chilliness. But these symptoms are sometimes wanting, or so feebly pronounced as to be unnoticed. Frequency of micturition, scanty, dark-coloured urine, and a puffiness of the face may be, and often are, the first symptoms noticed by the patient. General anasarca of the surface follows, with a pallor so peculiar, of such alabaster whiteness and purity, as to become almost a specific feature of the disease.

Case VII, 1858.—Frances G—, aged nineteen, was admitted into Queen Adelaide ward, on the 10th of November, suffering from general dropsy of the surface of the body. There was œdema of the face, arms, wrists, and back of the hands, as well as of the trunk and lower extremities. The swollen state of the face usually subsided as the day advanced. There was the usual pallor of the skin. There was some dyspnœa, with occasional cough and trifling expectoration of catarrhal mucus. The urine had been very scanty, and micturition distressingly frequent: during the night, the desire to pass urine occurred every hour, and the rest was consequently much disturbed. The urine had a cloudy, dirty, soot-like appearance, was highly albuminous, threw down a copious, coarse deposit, and exhibited under the microscope blood-corpuscles, coarse, granular, fibrinous flakes, containing blood-discs; large fibrinous blood-casts, many large granule-cells, and some scattered renal epithelial cells. She complained of a sense of fulness and aching across the lumbar region, and pain was excited by pressure over the region of each kidney. The chest was resonant; some catarrhal wheezing was heard in the large tubes. The sounds of the heart were natural. She stated that four weeks since she suffered from sore-throat, at a time when scarlet fever prevailed in the house in which she lived; that her voice and power of swallowing were affected; but that she had no distinct eruption on the skin; but was told she had, and was treated for, scarlet fever. As near as she can remember, a fortnight after the sore-throat, she noticed that her urine became very scanty, and of a dark-red colour, as if it contained blood. The catamenia had not appeared for the last six months. In a few days, she became conscious of a swelling in her face after sleep, and subsequently the hands, arms, feet and ankles became anasarcous. She was ordered a warm bath daily, the compound jalap powder every morning, a diaphoretic mixture every four hours, and to be clothed in flannel.

On the following day, she was dry-cupped across the loins which, with the above treatment, diminished the sooty appearance of the urine; and in two days, the quantity of urine had considerably increased.

A week after admission, the dropsy had completely disappeared. The urine was clear, specific gravity 1·018, and albuminous. The deposit, examined by the microscope, consisted of dense fibrinous casts, some blood-casts, a few scattered blood-corpuscles; very little epithelium was visible, and no epithelial casts could be seen. She was ordered the sesquichloride of iron, and an improved diet. But this treatment appeared to have been commenced too early, for on the 25th of November there was a return of hæmaturia, which, however, disappeared by the loss of a few ounces of blood from the loins by cupping.

On November 30th she again began to improve; there was no return of œdema, although the urine continued highly albuminous.

On December 4th the urinary sediment first gave warning of the unfavorable change which was commencing in the cell-structure of the tubes, notwithstanding the disappearance for a time of the dropsy, and the apparent improvement in the general condition of the patient. The urinary sediment had been examined every two or three days since admission, and up to this date it consisted of fibrinous casts, large, coarse granular casts, containing a few blood-corpuscles and a few scattered epithelial cells; but no epithelial casts, or free shedding of the epithelium, which is often observed in the dropsy after scarlet fever. But now the casts were becoming transparent, containing large compound granule-cells, some exudation corpuscles approaching in character to the pus-cell, and a few epithelial cells; and some of the casts contained numerous resplendent granules—the disengaged nuclei of disintegrated epithelial cells. Two days later the casts became still more transparent or hyaline, with an increased number of exudative corpuscles with reniform and trefoiled nuclei. The epithelial cells did not present any characteristics of fatty or abortive development. On the 11th of December, the anasarca of the surface again made its appearance. The urine became less abundant. Purgatives were again beneficially employed. The sesquichloride of iron was again taken, and for a few days another interval of improvement, so far as the diminution of the anasarca was accepted as a sign, was apparent. But the urinary sediment became more abundant. Large, solid moulds of fibrine, the greater part containing no cell-structure, many hyaline moulds, containing large, compound granule-cells, and many free nuclei, indicated that the disease was progressing most unfavorably. On the evening of the 27th December, she became very restless; and on the morning of the 28th, suddenly calling for assistance, she almost instantly became insensible. The jaws became locked; there was some rigidity of the extremities; the pupils were dilated; but there was neither convulsive movement, nor stertor, nor foaming at the mouth. The respiratory movements gradually became slower and less apparent, and she ceased to breathe, without any movement or spasm, at eleven, a.m.

*Post-mortem examination twenty-eight hours after.*—The external surface of the body was but slightly anasarcous. The pleural and abdominal cavities contained a small quantity of orange-coloured serum. The lungs were free from pleuritic adhesions, but were slightly œdematous. The heart was large; it weighed thirteen ounces and a half; there were several maculæ albidæ both on its anterior and posterior surfaces; the cavities of the heart, as well as the valves, were natural. The liver was healthy. The left kidney was the larger of the two: it weighed seven ounces and a half; it was irregular in shape, considerably lobulated above and below, very convex anteriorly, somewhat flattened posteriorly. The capsule was semi-adherent, and when removed, the kidney displayed a finely granular (sabulous) surface, pale in colour, with a few stellar vessels scattered over it. The interior, on a section being made, displayed the usual fine granular exudation infiltrating the whole structure, fraying out the base of the cones, and contrasting in colour with the pale-red striated appearance of this pyramidal portion of the organ. The right kidney weighed five ounces and three-quarters; the cones were more deeply injected than the other kidney, but in other respects the morbid conditions were similar, the disease not having advanced to the same point, one kidney being usually behind the other in progress.

A careful microscopic examination of these kidneys was made. The white deposit surrounding the cones, and constituting the mass of the disease, was composed of abortive cells, imbedded in what appeared to be a fine granular exudation.

This granular matter pervaded the whole organ, and was principally interstitial in regard to its relation to the tubes, as but little tubular structure could be discovered in it. The Malpighian bodies, however, appeared stuffed with this exudation, and the few tubes which were teazed out of the deposit, appeared blocked up with it. The epithelial cells along the walls of the tubes, at the base of the cones, appeared undisturbed, but compressed by the contents of the canal. The straight tubes at the apex of the cones were free open canals, the epithelium presenting a natural appearance; but here and there a large straight tube was observed choked with fibrinous coagula, of a brownish-yellow colour.

This case illustrates two important facts in the pathology of the kidneys. First, the relation which scarlatinal dropsy bears to acute morbus Brightii; and secondly, the character of the structural changes which at first impede, and ultimately destroy, the function of the kidney.

It was at one time doubted whether the renal disorder after scarlet fever had anything in common with these forms of disease described by the late lamented Dr. Bright, which the concurrent opinion of European pathologists now designates as morbus Brightii. It scarcely required the genius of a Rokitansky to identify them; yet that great pathologist has not hesitated to recognise in scarlet fever one of the most energetic causes of the acute form of Bright's disease. The symptoms during life are the same, and a microscopic examination of the renal structures establishes the identity of the morbid process beyond all objection. The student in clinical medicine should carefully observe and compare the progress of the symptoms in a case analogous to the present one in its origin, and one which has apparently arisen from exposure to cold and wet, and which is rapidly running an acute course. Frequent examination of the urinary sediment in both cases will exhibit the similarity of the matters thrown off from the renal tubes, and the identity of the changes proceeding in them; and a comparison of the structural changes in the kidney after death will complete the proof. In both, the kidneys will be beyond the natural weight, large, pale, and exsanguineous, with a few scattered, star-like, vascular points. The cones will present a remarkable contrast of colour to the surrounding deposit, varying from a pale pinkish madder, to a deeper tone of madder red; they display the linear markings of the straight tubes frayed out at the base, fancifully compared to a sheaf of corn.

Microscopically examined, the whole structure of the organ, tubular as well as interstitial, is seen infiltrated with a product which fills and chokes the tubes, obliterates the Malpighian capillaries, permeates the interstitial plexus of vessels, and eventually offers such an obstacle to the course of the blood and circulation through the kidneys as to bring within limits incompatible with life the excretory power of these organs. The mode of death, in both cases, is clearly traceable to this cause; for, in the great majority, the patients die with symptoms referable to a poisonous agency operating upon the nervous centres, and coma, with or without convulsive movements, is usually the indication of the fatal termination by uræmic poisoning.

As the renal disorder which succeeds to scarlet fever is identical with the acute form of morbus Brightii, it follows that the principles on which these cases should be treated must be the same. They may be summed up in a few words. To lessen the watery or dropsical state of the blood, and to diminish the local blood stasis in the kidneys. The first is obtained by acting briskly on the intestinal mucous surface, by which a large amount of fluid is rapidly eliminated from the system. The second object is secured by calling into activity the functions of the skin by diaphoretics, warm clothing, and warm or hot-air baths. The functions of the skin are vicarious of those of the kidney, and whatever augments the first lessens the activity of the latter. The congestion of the kidneys is further alleviated by dry cupping, and occasionally by abstracting blood by cupping from the loins; but the cases are exceptional which will require the abstraction of blood. If these objects can be successfully attained—indicated by the disappearance of the dropsy and the absence of blood from the urine —no time should be lost in placing the organism in a condition to regain those qualities and powers, the loss of which are most plainly manifested by the impoverished state of the blood. Amongst medicinal remedies, the ferruginous are the most essential; and amongst these, the tincture of the sesquichloride of iron is the most valuable and efficacious. But chalybeates are useless without a well-ordered diet. Nutrition must, therefore, be promoted, and it may be aided by a limited allowance of wine. Our best directed efforts are, however, often frustrated by the intensity of the disease and rapidity of its progress. And this case furnishes an example of the fatality of this disease, notwithstanding the favorable results which remedies seemed to produce; but it also teaches the value of microscopic examination of the urinary sediment from time to time; and we are taught that by a careful attention to its revelations the insidious progress of the disorder may be demonstrated and recorded even while the progress of the patient, in all other respects, appears to continue satisfactory.

In these cases the period of inflammatory engorgement or hyperæmia is sufficiently well marked by the presence of hæmaturia, and the successive phases of the disease are significantly expressed by the characters of the urinary depesit.

At the period when these cases of scarlatinal dropsy occurred there still lingered amongst us a remnant of the old principles of treatment, which inculcated the necessity for taking blood locally to relieve such organs as the kidneys from a state of engorgement, and cupping from the loins was ordered in several instances. Experience has convinced me that such treatment by local bleeding is needless, and may be harmful. Dry cupping is less objectionable; but the relief aimed at may be more effectually obtained by the hot air bath and promoting the functions of the skin.

# CHAPTER X.

## ACUTE AND CHRONIC MORBUS BRIGHTII.

### *Acute morbus Brightii.*

The characteristic features of the acute form of this disease may be gleaned from the cases already detailed, demonstrating the identity of scarlatinal dropsy and acute morbus Brightii. In a pathological point of view, no difference can be detected. The only distinction traceable is in their ætiology. In the one, the scarlatinal poison seems the exciting cause: in the other, cold and wet operating on a peculiar state of the blood, not yet elucidated, but which must be admitted, for the exciting causes of cold and wet, only develope this disease in certain apparently predisposed constitutions.

It may, nevertheless, not be uninstructive to sketch faintly the leading features of the early stage of acute albuminuria, and the subsequent cases will appropriately fill up the outline and complete the picture.

The predisposing causes of the great majority of acute cases of albuminuria, is unquestionably the abuse of fermented or alcoholic drinks. The blood becomes poisoned—alcoholized—not by a single debauch, but by the habitual use of stimulants in excess. There are certain classes of the working population who from their habits are more frequently the sufferers from this form of disease than others. Railway labourers—*navvies*—men of large Herculean frames, great consumers of meat and beer, the most reckless in regard to their health, being employed chiefly in ground work, carmen, carters, and draymen, cab drivers. A man whose blood is saturated with an alcoholic poison, can ill bear the baneful influence of those common exciting causes of disease, cold and wet. Accordingly, we almost invariably find the patient dating the commencement of his symptoms to these causes. In some cases, after such exposure a patient has a distinct rigor; in others, feeling simply unwell, he goes to bed, wakes restless, and short-breathed, with scanty and all but suppressed urine, either distinctly blood-stained or dark coloured as coffee or porter. Usually after the first sleep a dropsical state of the whole body shows itself. In mild cases, expressed by puffiness of the upper and lower eyelids, a slight œdema of the ankles, and back of the hands: but in severe cases, a diffuse œdema involves eyes and cheeks, upper and lower extremities, abdominal, and even pulmonary cavities.

In the more acute cases the pulmonary œdema gives rise to most distressing symptoms of dyspnœa. The bronchial mucous membrane becomes turgid and swollen; and cells of almost every variety belonging to this tissue are excreted in the sputa.

The rapid diffusion of the dropsy through all the textures of the body would seem to arise from the well-known physical property of imbibition.

This property of imbibition, or of swelling up on the addition of water, is possessed by all cells.

It is most apparent, the greater the difference between the specific gravity of the contents of the cell and the surrounding or external media. In the field of the microscope cells may be seen to swell up and burst when floated in distilled water. In like manner, when the tissues are soaked with the serous and watery elements of the blood, the cells not only of the areolar connective tissue swell up, enlarge, and even burst—as in extensive anasarca of the lower extremities; but similarly, the cells of internal organs are affected, they also swell up, to the manifest interruption and disturbance of the functions pertaining to them.

Concurrent with this development of a wide-spread dropsy diffusing itself through all the tissues, it is not surprising that the blood should, from the first, offer characters widely deviating from the healthy standard; presenting alterations in its constituent parts, of which the most notable are the increase in the water, the decrease of the red corpuscles, and the increase of the colourless cells, to which must be added an increased amount of some excrementitious products, the chief of which is urea. This form of dropsy was once called and treated as inflammatory dropsy; and the irritable heart, with the frequent pulse, the increased temperature of the skin, the febrile disturbance, the loss of appetite, and general derangement of the functions, are symptoms of inflammatory action which justified the opinion in those days that the disorder was essentially inflammatory. At a period when the doctrines of inflammation played so important a part in the theory of medicine, and when the principles of treatment necessarily followed the theory, it was but reasonable that the meaning of the symptoms should be interpreted to require the usual measures of the antiphlogistic regimen.

The suddenness of the attack, usually after exposure to wet or cold, the scanty blood-stained urine, the presence of febrile rigors, the hurried breathing, and frequent pulse, the hot skin, thirst and inappetency, and the general prostration, are unequivocal signs of acute disease, having all the character of inflammatory action. The congested state of the kidneys, the embarrassment of their function, the all but suppressed urinary excretion, are accompanied, in the more acute forms of the disease, by a remarkable change in the anatomical character of these organs. A tumultuous pathological process occurs, the result of which is a great increase in the size of the organ from a rapid accumulation of a granular matter—which appears both interstitial and intertubular—and which, when microscopically examined, seems to be derived from an immense development of abortive or imperfect cells, filled with the fine granular material which appears to constitute the bulk of the organ. (Plate XI, fig. 1.) These acute cases will often run their course with a fatality which no method of treatment appears able to arrest.

But rapid and fatal as these cases are, they leave behind them abundant proof that though the focus of the disease has apparently been concentrated in the kidneys, yet that other textures have been similarly affected, and that cell-development in other organs is equally the seat of deterioration and decay.

It is, however, chiefly by the study of cases which run a more sluggish course, either passing from an acute form to the chronic, or originating more slowly, with less evidence of a so-called inflammatory origin, that the wide-spread degeneration of tissue can be more clearly and satisfactorily demonstrated.

## ACUTE MORBUS BRIGHTII.

*Hæmaturia—general dropsy—morbus Brightii running an acute course — urinary deposits significant of the disease—rapid degeneration of the renal epithelium — œdema of the lungs —death. Kidneys much enlarged, pale, and fatty.*

Case VII.—Samuel Osborn, æt. 24, employed as a carman, was admitted into Burdett Ward, March, 1856. There was anasarca of the entire surface of the body, the face was œdematous and of a wax-like whiteness; the arms, wrists, thighs, ankles, feet, pitted deeply on pressure, the scrotum was infiltrated with fluid, and the abdomen afforded some obscure evidence of fluid within it. The breathing was short and hurried, with frequent paroxysms of dyspnœa, and harassing cough with little or no expectoration. The resonance of the chest was defective, and moist mucous murmurs, with wheezing and cooing, were heard in all parts of the chest. The pulse was 90, full and hard. The tongue was furred, the bowels constipated, febrile thirst, and general restlessness. The urine was of a blood-red colour, of a specific gravity of 1·021, and highly albuminous. Examined the day after admission under the microscope, it afforded the appearance represented in Pl. II, fig. 6. Fibrinous casts containing blood-discs and epithelial cells, a few of the latter appearing fatty and abortive; prognosis unfavorable. His history was that of a young man of intemperate habits, freely exposed to all weathers. He stated that he had never been ill till within the last seven days, when he went home one night from work, having felt chilly and weak all day. He suffered at this time from dull, aching pains across the back; he noticed that his legs, feet, and ankles swelled at night. He frequently made water, and it seemed to him that he passed blood. On the following morning he felt his face swollen and puffy, and was unable to go to his work. Ten ounces of blood were taken from the arm, with immediate relief to his breathing. The clot was moderately firm and slightly buffed on the surface; the specific gravity of the serum was only 1·019. The bowels were freely acted on by cream of tartar purgative, and the diaphoretic mixture gave relief to the febrile restlessness and thirst. He was relieved also by warm baths. The hæmaturia continuing, he was cupped two days after from the loins. On the sixth day from admission, the urine to the unaided eye appeared free from blood, was scanty, however, in quantity, and threw down a copious deposit of lithates. The deposit seven days after admission is represented at fig. 7; the fibrinous casts now contained epithelial cells, as well as a few scattered blood-discs. The most characteristic objects, however, were the granular casts of the tubes, containing epithelium in great abundance. Here and there were a few detached epithelial cells, but the greater mass of them was enclosed or entangled within the casts. A few gave signs of fatty degeneration, in the form of fatty molecules, either on or within their walls. Twelve days from admission the dropsical condition remained unsubdued, although relief had been afforded to the breathing; indeed, the anasarca seemed to increase. He now took elaterium, in half-grain doses, every alternate day. The purgative produced most salutary hydragogue effects. The pills acted vigorously and copiously, and he bore the purging well. After the third pill a marked diminution of the dropsy became apparent. The fluid disappeared from the scrotum, the œdema of the face notably diminished, the breathing was free and easy, the stomach was able to appropriate light nutrients. The urine was very scanty, and contained a great deal of epithelium in granular casts (fig. 8), with much free fat- and some compound fat-cells. The amendment which followed the action of the elaterium was of short duration: before the end of the week, the third since admission, the anasarcous state of the surface again increased. He took digitalis and squill, with the effect of increasing the quantity of urine, but not of abating the dropsy. The urine became more abundant, however, lighter coloured, and of low specific gravity—1·009. The deposit in the urine exemplified the progress of the disorder in the direction of granular degeneration. The casts became more and more fatty and granular, numerous compound fat-cells made their appearance, and these changes told unequivocally how rapid was the progress of the renal disorder. The irritability of the stomach returned, the respiration became more disturbed from the increasing œdema of the pulmonary tissue. Symptoms of exhaustion came on, the breathing became more and more laboured and gasping, and he died on the 21st of April, thirty-four days from admission, and about forty-one from the earliest appearance of the hæmaturia.

*Post-mortem examination.*—Every tissue of the body seemed infiltrated with water. When a section was made through the abdominal walls, the dropsical state of the areolar tissue presented a singular appearance, from the contrast between the cells filled with serum and a few scattered ones still containing fat. The cut surface presented an almost gelatinous look, and was very like blubber, striped with muscular layers. Both the pulmonary and abdominal cavities contained some fluid. There were slight pleural adhesions. Both lungs were gorged with fluid, pitted on pressure, and presented the usual appearance of œdema pulmonum. A great quantity of a thin, frothy serosity escaped from them on a section of the parenchyma. The bronchial mucous membrane throughout was injected of a madder-red—it was tumid and soft. The heart was large and flabby, weighed twenty-two ounces. On the surface of the right ventricle was a patch of opalescent opacity, about an inch square—(macula albida). The valvular structure of the heart was complete, the cavities were not disproportioned to the size and weight of the organ. Both kidneys were very large, lobulated and of a pale colour; when the capsule was removed a few aborescent vessels were seen on the surface, which was very finely granular. The left kidney weighed ten ounces; the right ten ounces and a half. A section showed that the granular deposit had almost obliterated the cones; it compressed the calyces and diminished the capacity of the pelvis very considerably. Microscopically examined, the Malpighian bodies and the convoluted tubes of the cortex were seen filled with granular matter, containing abundance of highly resplendent fatty and oily molecules, which were easily removed by ether, leaving the granular matter undissolved. The epithelial structures had, wherever visible, undergone marked degeneration. In the tubes, teazed out from the scanty portion of the mammillary cones, some of the epithelial cells presented the usual appearance; but the canal appeared filled with free fat-globules, compound fat-cells, and granular matter. (Pl. II, fig. 11.)

The microscopic conditions of the urine during the lifetime of this patient, compared one with another, clearly demonstrated the progress and direction which the renal disorder was taking; and I think we obtain proof of the reliance which may be placed on the progressive changes which the urinary deposit undergoes as the disease advances.

The tube casts at first were fibrinous, containing blood-discs and a few epithelial cells. Even thus early some of the epithelial cells appeared abortive, containing several distinct fatty nuclei. The casts then became more granular, and there was a larger proportion of epithelial structure; free fat-molecules, and one or more compound fat-cells, with abortive epithelial cells, made their appearance. Within a fortnight the casts became more characteristic of the degenerative process, the compound fat-cells (Gluge's) were still more numerous, the casts more fatty, the epithelial cells more abortive, and within a week of the patient's death, further evidence presented itself of this rapid and intractable disorder. I think, therefore, we may accept these successive changes in the appearances of the urinary deposit as specific conditions, and inferentially they may be received as trustworthy exponents of the course of the disease. The increasing number of, or the continuous presence in the urinary sediment of, these compound fat-cells (Gluge's corpuscles), brought away with the granular casts of the tubes, mixed with ordinary or abortive epithelial cells, is a pathological fact —however it be interpreted—associated with an unfavorable progress. Dr. Birkett, in his excellent edition of the late Dr. Golding Bird's work on 'Urinary Deposits,' remarks on the frequency of these so-called inflammatory globules of Gluge in morbus Brightii, and asks whether it be possible that these globules may here be indicative of subacute inflammatory action going on in the structure of the kidney? Considering that the renal disorder commences with symptoms of inflammatory engorgement, and that these compound granule-cells appear after, or indeed immediately succeed, these symptoms of acute inflammatory action, there might exist fair reasonable grounds for supposing their presence indicative of a subacute inflammatory process. Their presence, moreover, in subacute inflammatory conditions of other mucous surfaces, lends additional force to the conclusion that they are expressive of similar pathological conditions in the kidney. But whether this view be accepted or not, their presence in increasing number is a certain indication of the fatal progress of the renal disease.*

If the inflammatory, or at least the hyperæmic stage, be conceded as an essential element of the disease, and if we view the succeeding states as products of that stage, we have yet to trace the disease—that is, the earliest manifestation of renal disturbance—to remoter causes. The renal engorgement is not a primary, but a subsidiary condition; it is not the first in the order of morbid change, although it be the most prominent and the most apparent; it is most certainly secondary to more remote morbific action pervading the system throughout. There must be some obscure condition pre-existent, which determines the incipient renal engorgement, and an altered defective, or contaminated state of the blood is the source, in all probability, of the morbid phenomena which follow. A careful inquiry into the antecedents of those patients, will exhibit the predisposing causes of their failing health; and these will ever be such as exercise a marked influence over the quality of the blood, rather than having any special reference to the kidneys.

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* It is now admitted that these cells are not indicative of inflammatory action.

Thus the most frequent and patent of these predisposing causes are, habits of intemperance, inducing an alcoholized state of the blood, leading to hydræmia; the various febrile poisons, particularly the scarlatinal, which is, perhaps, the most constant if not the most powerful of any; the scrofulous habit of body; the tubercular constitution. If improper, deficient, or unwholesome food, or the deleterious influences of cold and wet, co-operate with these predisposing states, we have agents powerful and effective to vitiate the purity of the blood; for they are severally capable of bringing about such molecular changes in its composition, that the equilibrium of healthy functions is destroyed, and local congestions, or states of hyperæmia and stasis, are the consequence. Imperfect nutrition, impeded function, degeneration of structure, follow; secreting cells become abortive and fatty, or disintegrated; their place is supplied by a granular and albuminous deposit, the increasing amount of which impedes more and more the passage of blood through the kidney, till it reaches the point at which barely a vestige of secreting structure is left, and the blood becoming more and more watery, the patient succumbs, either with symptoms of œdema pulmonum, or from uræmic poisoning. It will be observed that this patient, in 1856, was bled from the arm and cupped from the loins; a plan of treatment which I should now hesitate to follow, and which experience has taught me to be prejudicial in similar cases.

## CHRONIC MORBUS BRIGHTII. GENERAL CHARACTER OF THE SYMPTOMS.

The symptoms of the acute form of morbus Brightii are easily recognised; the congestive stage, with its febrile disturbance and its hæmaturia, quickly followed by diffused anasarca, can never be mistaken, but the early stage of the chronic form of the malady does not present such well-marked characteristics; and, moreover, the symptoms vary in different individuals; for it by no means follows, as I was formerly induced to believe, that chronic disease has invariably an origin in an acute inflammatory stage. It is most certain that the acute form of the disease may and does frequently degenerate into the chronic; but there are, nevertheless, examples of frequent occurrence in which the origin of the chronic malady cannot be traced with any certainty, and the commencement of which is scarcely to be recognised by any other token than a gradual failure of the general health, and which is casually designated as a "breaking-up" of the constitution. Yet, if particular attention be paid to the early period of the failing health in these cases, there are symptoms which in a great many cases may be recognised; and when they occur, I believe may be accepted almost as pathognomonic of this chronic form of renal degeneration. The chief and most common of these is dyspnœa,—shortness of breath, quite apart from, and independent of any bronchial or pulmonary catarrh or disturbance. The patient observes every now and then how short his breath has become; in an ordinary walk he will stop to recover his breath; he wonders that he is so short-winded; he attributes it to indigestion, or to the probability of his becoming asthmatic. Occasionally the attacks occur at night; but chiefly during the day. There is more or less palpitation of the heart during these paroxysms. Weeks often pass before these symptoms have become sufficiently grave to require medical advice. Generally speaking, some wheezing at the chest attracts the patient's attention, but this is by no means constant at first. The chest is examined, and during this early period the heart sounds may be feeble, there may be some wheezy murmurs, but nothing approaching to bronchitis or bronchial catarrh can be detected. No symptoms of emphysema are present. The sounds of the heart are feeble, and may suggest fatty degeneration; but neither lungs nor heart afford any interpretation of the attacks of dyspnœa. If the urine be examined at this early period, the presence of small quantities of albumen may be detected, and the sediment will afford examples of granular casts, with more or less decayed or broken up cell structure. These conditions often manifest themselves long before any dropsical symptoms point to the existence of renal disorganization. There are cases in which the urine at this period is non-albuminous, but these are certainly exceptional.

Other cases of chronic albuminuria commence with aching, wandering pains in the limbs, which are considered as rheumatic, and treated accordingly. Some commence with palpitation of the heart, accompanied by symptoms indicative of gastric disturbance, and even symptoms of gastric catarrh, with vomiting. Almost at the very earliest period, in the majority of these cases, albumen and a characteristic sediment in the urine may be detected. The earlier a knowledge of these facts is obtained, the more beneficial will the treatment become. Not because that treatment is directed to the kidneys specially, but because the albuminous and sedimentitious urine is accepted as evidence of a decay pervading the organism, and which can only be arrested by improved nutrition, and measures directed to the support and strength of the vital force.

It is satisfactory to observe how much may be accomplished in these cases by a treatment governed by these general principles, rather than on a view limited to the contemplation of the morbid state of the kidneys only. The following case will illustrate the character of the early symptoms, as well as the insiduous commencement of chronic albuminuria.

Case IX.—I was requested by my friend, Mr. Holt, to see a gentleman with him who was suffering from some obscure pulmonary symptoms. This patient was a native of Wales, æt. 36. His parents died at an early age. He had lived a fast life, and within a few weeks his health began to break, his appetite to fail, and his breathing so seriously affected, that he would be seized with a paroxysm of shortness of breath unexpectedly in the street, which for a few seconds deprived him of all power of motion, and he needed the support of the nearest object to prevent him from falling. Stimulants, for a time, gave him relief. It was desirable to ascertain on what these paroxysms of dyspnœa depended, and to what extent either heart or lungs, or both, were implicated. At the time of my first visit and examination the aspect of the patient could not be estimated, as he was in a bedroom to which the light of day scarcely entered, and the darkness of which, by contrast with the glare of day from which we came, was the greater, and which the feeble light of a candle in no way lessened. It may seem an unimportant matter; but the advantage of seeing and examining a patient by daylight, will be admitted by all who are conversant with the physiognomy of disease.

The patient was undressed and in bed for the facility of examination. A careful exploration of the chest failed to detect any defective condition of respiration. The heart sounds were regular, but very faint and feeble in intensity, while there was a disproportioned impulse. The question to be solved was, whether anything in the lungs or heart would explain or account for the sudden attacks of dyspnœa. With the exception of defective appetite and ability, this paroxysmal dyspnœa was the only symptom of prominence. The chest was uniformly and naturally resonant, and the breath sounds throughout were natural, though feeble. The opinion I formed, and expressed at the time was, that although there was no organic condition in the mechanism of the heart and lungs to account for these attacks, yet from the feeble valvular sounds, and the increased impulse of the heart, labouring as it did to drive the blood both through the pulmonary and systemal circulation, the probability was that the blood was undergoing some special morbid change, such as marks the course of albuminuria, and which unfits it for free and rapid circulation through the capillaries, the effect of this would be, that the impure blood would stagnate and accumulate in various organs, and give rise to functional disorders characteristic of the seat of the disturbance. I suggested that the urine should be examined, and a sample was promised to be sent. But this was not done. I could only therefore express my fears that the condition of the patient was serious, and would terminate either in morbus Brightii or fatty degeneration of the heart, followed by renal disorganization. He left in a few days for Brighton, expecting that change of air would prove beneficial. Two months afterwards I was again requested to see this gentleman. And now having the advantage of daylight, the appearance of the patient was at once characteristic of some blood disease. Only thirty-six years of age; his hair was prematurely gray; the complexion was pallid, not a bloodless pallor, but a pasty, putty-like sallowness. His breathing was hurried and short, and a dry hacking cough increased its frequency. The inferior part of the body was anasarcous, even to the walls of the abdomen, the cavity of which contained fluid. The chest was moderately resonant, but the respiratory sounds were defective, and, in places, coarse, as in œdema pulmonum with wheezing murmurs. The impulse of the heart was very great; the head being sensibly raised at each stroke of the heart; the sounds were distant and feeble. The pulse was very small and compressible. The urine was very scanty, and was high coloured, and mahogany-like, and which appearance of his urine was noticed at Brighton, and led to the detection of albumen in it. A sample of the urine had been sent for examination the day previous. It was albuminous, and the microscope revealed in the sediment, numerous crystals of oxalate of lime, amorphous granular groups of urate of ammonia; many coarsely granular casts; a few hyaline ones of small diameter, and some compound granule-cells with numerous resplendent nuclei. The nature of this gentleman's malady was thus unequivocally displayed, and the prospects of improvement or recovery were viewed as very unfavorable. Cream of tartar purgatives; the sesquichloride of iron; a liberal diet, and regulated allowance of stimulants for a time, appeared to exercise a beneficial influence. After a time he left town, and I did not see him again. I was subsequently informed that he lived through the winter, and died in the spring of the year, some ten months after the first appearance of albuminuria, and a twelvemonth after the incipient symptoms of dyspnœa had suggested the probability of renal disorder being the sequel of this symptom.

In looking over my notes of recent cases of chronic morbus Brightii, I find six within the last few months, which commenced with the symptoms of dyspnœa. In one, a case I saw with Dr. Ladd, of Brixton, the dyspnœa came on in the summer months without any marked symptoms of renal disturbance, the earliest which pointed towards these organs was troublesome frequency of micturition. In this case Dr. Ladd found the urine albuminous some weeks before any dropsical symptoms, even œdema of the ankles, had shown themselves. The case was complicated with cerebral disease, for during the winter he was seized with momentary unconsciousness and subsequent hemiplegia, but the fatal termination was clearly dependent on the renal disorder. It is not necessary to multiply examples of the premonitory character of fits of dyspnœa, or shortness of breath, in relation to renal disorganisation. The knowledge of this fact is of value, as leading at a very early period to a correct diagnosis, on which a safe and often successful plan of treatment is based. Paroxysms of dyspnœa, without any emphysematous state of lung, or chronic disorder of the bronchial tubes, or other organic cause to account for it, with albuminous urine, but without dropsy, must be regarded as evidence of the earliest stage of chronic albuminuria, and the only period which holds out any prospect of arresting the fatal progress of this form of renal degeneration. As the diseases advances the signs of bronchial catarrh become very prominent, and moist, wheezing and coarse murmurs are heard oftentimes all over the chest, and when to these symptoms are added those of diffuse anasarca, perhaps of many weeks' duration, the results of treatment are often doubtful; nevertheless, it is encouraging to know that a well defined plan of treatment, systematically and regularly carried out, uninterrupted by the caprices of the patient, or the injudicious interference of friends and relations in many cases yields the most satisfactory results.

The paroxysms of dyspnœa which usher in the early stages of chronic morbus Brightii, must be accepted as evidence of an altered, impure, and diseased state of the blood, rather than as proof of any organic alteration in the structure of heart or lungs. It is a well known physiological fact that blood stagnates in the capillaries in a degree proportioned to its impurity. Whenever defective function in any excreting organ causes the accumulation of excrementitious matter in the blood, retarded or impeded capillary circulation is the most obvious result.

In other cases of chronic albuminuria some defective state of the blood operates in this way.—It accumulates in the pulmonary capillaries; difficulty of breathing is the consequence; and after a paroxysm of longer or shorter duration the patient recovers his breath, and for a time the respiratory function proceeds, with only occasional interruptions to its regularity. But these interruptions to the integrity of such an important function are always followed or accompanied by a marked change in the epithelial structure of the bronchial tubes, not sufficient to explain the occurrence of the dyspnœa, but sufficient to suggest that the paroxyms are evidence of the defective nutrition, or imperfect reproduction of these layers of epithelium.

Although the early paroxysms of dyspnœa are not always accompanied by wheezing murmurs, yet, after a short time, they are heard in the larger bronchial tubes, and the patient will expectorate a scanty, pearly or greyish mucus. When this is examined by the microscope it is seen to be composed of compound granule-cells—that is, epithelial cells, abortive, imperfect, and effete. These facts will, I think, establish this doctrine in relation to the disease under consideration: that morbus Brightii, in whatever form, has its origin in some defective state of nutrition, some imperfect power of cell-reproduction derived from an altered or diseased state of the blood, and that the most rational and most efficient principle of treatment will be that which, while not neglecting attention to the most obvious functional disturbances, nevertheless looks chiefly to the restoration of the blood to a more healthy condition before any beneficial alterations can be expected in the functions of those organs which are most obviously deranged.

## CHRONIC ALBUMINURIA.

*Relation of the hyaline, cloudy, or waxy casts to the more chronic and fatal forms of morbus Brightii.*

Case.—Robert Eden, æt. 38, a smith by trade, was admitted February 3rd, 1857, suffering from anasarca of the lower extremities, ascites in moderate extent, frequent micturition, and scanty urine: also cough, dyspnœa, and expectoration of ordinary and catarrhal mucus.

He had been out with the Army Works Corps in the Crimea, where his health remained for a time good; but he was ultimately seized with dysentery, and sent home. He has never been thoroughly well since; but he continued able to work off and on till last Christmas, when he had some febrile symptoms, with dark cherry-coloured urine, small in quantity. About this time he felt his ankles and legs swell, and the dropsy has of late rapidly increased. The anasarca was now general, and the abdomen contained fluid. The urine was very high coloured, sp. gr. 1022, throwing down on cooling an abundant deposit of fawn-coloured lithates. It was also highly albuminous. The coagula occupying two-thirds of the tube after a period of rest. There was diarrhœa on admission. This was not interfered with beyond what influence gallic acid might produce. He had warm baths with great advantage.

On the 9th of February the urinary sediment was first examined. The urine was quite as albuminous as on admission—was high coloured, and it became necessary to dilute the urine with distilled water, at the temperature of 90 to 95, for the purpose of keeping in solution the lithates, and allowing whatever tubular sediment might be present to subside. The lithates of ammonia and soda often cohere in very suspicious-looking linear groups, and I have known an unexperienced observer mistake them for granular casts. Therefore, however small the quantity, if the lithates give the slightest cloudiness to the urine, their solution by the addition of warm water is necessary for microscopic observation, for they may be precipitated on the casts, and, adhering to them, give them a spurious granular appearance. The casts found in the urine at this first examination were partly granular, partly transparent. There were many free nuclei, and several grape-like clusters of fat-granules or nuclei, without any cell-wall. The healthy epithelial cells were very few in number.

The treatment by warm baths and gallic acid seemed to be beneficial, for the urine became clear, the proportion of albumen less, the anasarca decreased, and the respiratory movements free. The bowels becoming torpid, he took the compound jalap powder, and continued the gallic acid. On the 16th of February, the anasarca was considerably reduced, but the urinary sediment remained unchanged. The urine examined on February 20th, February 27th, and March 4th, (Pl. VI) presented the same general appearance. Transparent casts, some slightly granular, with abortive cells—large compound granule-cells, many free nuclei, and many botryoidal clusters of nuclei, without any cell-wall. These appearances of the urinary sediment continuing unchanged, notwithstanding the apparent improvement of the patient, the decrease of the dropsy, the diminished frequency of micturition, and other evidences of amelioration, led me to form an unfavorable opinion.

On the 12th of March the urine, which had increased in quantity, again became deficient, and the anasarca rapidly increased. He now took elaterium with temporary advantage. The anasarca again became less. The urinary sediment, if anything, gave proof of advancing renal degeneration. The compound granule-cells became larger and more abundant.

The casts preserved their hyaline character, with free nuclei. In the beginning of April, the symptoms generally being the same, the urine showing a disposition to become more abundant, he took digitalis and cream of tartar with temporary benefit; the flow of urine becoming greater, and the anasarca not increasing; the urinary sediment presented the same features, and this excretion continued quite as albuminous. The treatment by digitalis and the bitartrate was continued for a month; and, in the first week of May, the report was very favorable; the urine abundant; the anasarca confined to the legs below the knees, the hands and upper part of the body being quite free. There was fluid in the abdomen, but the infiltration of the scrotum had disappeared. The urinary sediment was abundant and unchanged.

He continued thus, with the dropsical symptoms varying in extent, till the first week in June, when dysenteric symptoms manifested themselves—tenesmus, sanguineous dejections, with shreddy lymph-like flakes, and copious diarrhœa continued, uninfluenced by remedies, to add to his exhaustion; the effect of these discharges was the rapid subsidence of the anasarca; but he daily became more exhausted, and died June 18th.

The post-mortem examination revealed the kidneys most enormously enlarged. The right weighed seventeen ounces; the left something under sixteen. They were of a pale-white fawn colour—lobulated, and soft. The surface smooth, and free from vascular marking.

A section displayed the almost entire obliteration of ordinary renal structure. The pyramids were apparently merged in the mass of surrounding degeneration, so that only a few faint pink lines, converging to a point, represented the cones. The colon throughout was injected; but the inferior part, towards the rectum, as well as that portion of the intestine, were of a slate-gray colour, somewhat nodulated or puckered, and in the lowest portion the mucous surface presented the appearance of a friable, blackish, carbonaceous deposit.

There were some adhesions in the pleuræ—the lungs were free from œdema. The liver was large, soft, granular, and fatty. The heart had two maculæ albidæ on its surface. The cavity of the abdomen contained a considerable quantity of dropsical fluid.

Drawings were made of the microscopical appearance of the kidneys—both of the pale fawn-coloured mass, as well as of the few remaining tubuli of the cones. These drawings have unfortunately been lost. But the appearance of the cortical part was as of tubes choked up and surrounded by a fine granular and fatty deposit. Wherever cell-structure was visible, the appearance was of finely granular cells—much smaller in size than the ordinary epithelium of the convoluted tubes. The few straight tubes which were teazed out with needles exhibited the epithelial layer disorganized, and the canal apparently choked with granules and fat. The inference I draw from the microscopic conditions of the urinary sediment throughout the five months this case was under observation, is, that when the casts continue to present week after week a great number of free nuclei, associated with these hyaline cylinders—numerous compound granule-cells, some with, some without cell-walls—the progress of renal degeneration in the most obstinate and intractable form is fatally progressing. The most significant appearance is that of botryoidal clusters of nuclei without a cell-wall. And the only distinction which can be found of any importance between the hyaline casts in favorable cases, and those where the disease is fatally progressing, consists in the presence of these clusters of nuclei, expressive of broken-up and disintegrated cells.

## CHRONIC ALBUMINURIA.

### *Nodulated kidney. Dr. Bright's third variety—a fatty degeneration, with atrophy and obliteration of vessels and tubes.*

Case X.—Wm. Pitt, æt. 37, was a patient of the Westminster Hospital in the latter part of 1856, suffering from scrofulous ulceration of the left thigh, above the knee. He was transferred to the care of my colleague, Dr. Fincham, in January, 1857. No history of the case was obtained while in the surgical wards. When he came under Dr. Fincham's observation there was moderate anasarca of the surface. The urine was highly albuminous, pale, and of low specific gravity. No examination of the sediment was made. He died with symptoms of low inflammation of the lungs, and œdema pulmonum. The kidneys were not increased in size; the cortical surface was studded with numerous yellowish small tubercles, about the size of, or rather larger than a mustard seed. A section of the kidneys displayed the cortical part shrunken, and the base of the pyramids approaching close to the circumference of the kidney. The kidney exhibited very much the appearance represented in Dr. Bright's third plate. The cones were frayed out and their tubular structure closely approximated in places to the very cortex. The case was a well-marked one of granular degeneration, and the microscopic conditions of the kidney are represented in Pl. VII, figs. 10—15. The tubercular eminences or granulations seemed formed by Malpighian capsules, the adjacent convoluted tubes being stuffed to repletion with fine granular and fatty matter; in one part not a trace of epithelial structure was visible; in some of the convoluted tubes, here and there one was apparent. The spaces between these tubercules or granular deposits seemed of a denser material, were not so yellow in colour, and under the microscope presented the appearance of condensed fibrous structure. It was with difficulty torn or teazed out into shreds; it broke abruptly. It is represented in figs. 13, 14, 15. An obscure tubular arrangement is visible in parts. A part yielded to the process of tearing by needles, and film-like bands, very thin and diaphanous, as of compressed and atrophied tubes, became apparent. (Figs. 13 and 15.) In figure 15, the dense fibrous-looking part, *a*, became resolved into and continuous with the tubes frayed out at *b*. This dissection supports Dr. Gairdner's view, that in those parts of the kidney which are no longer subservient to secretion, from the degeneration or destruction of the glandular epithelium, the vessels or tubes become obliterated; the vascular structures, as well as the tubular, become condensed and obsolete; and as this takes place unequally—some tubes and Malpighian tufts continuing stuffed with granular matter and fat, as shown at figs. 11 and 12, an irregularity of surface is the result, which may be either coarsely granular, roe-like, or tuberculated, according to the extent of atrophy and obliteration which has taken place in the parts contiguous to those in which the deposit has taken place. Dr. George Johnson would call this a case of non-desquamative disease. But the epithelium has evidently been shed or destroyed, from the naked appearance of the half obliterated tubes; no effort of renewal has been made; and the parts lost to the function of secretion, pressed on by surrounding exudative material, become atrophied, obliterated, and dense; they shrink, and give to those isolated parts stuffed with granular and fatty deposit the appearance of tuberculated irregularity of surface.

### CONNECTION OF MORBUS BRIGHTII WITH GRANULAR AND FATTY DEGENERATION OF THE ARTERIES OF THE BRAIN, AND OF THE HEART-FIBRE.

*Albuminuria,—general dropsy,—granular and hyaline casts in the urine:—relief:—relapse in six months:—progress of degeneration:—death by apoplexy and cerebral hæmorrhage.*

Case XI.—John L—, æt. 50, a bricklayer, first came under my observation in the month of July, 1856. He had been out of work for many weeks in consequence of gradually failing health; and want and exposure seem to have been immediately instrumental in reducing him to his present condition. About eight days since he first began to swell in the ankles and feet; his breath became short, his face puffed in the morning. He noticed his water had become scanty and dark coloured. On admission, the anasarca extended from the ankles to the thighs, and involved the scrotum and prepuce in dropsical infiltration. The aspect of the patient was characteristic of renal dropsy; the skin had an alabaster whiteness. The surface of the chest was anasarcous, the breath sounds were obscure, no moist murmurs: the cough was frequent, but there was no expectoration. The pulse was eighty-four, and the sounds of the heart were natural. The urine was clear, moderately albuminous, and of sp. gr. 1·018. The deposit is represented at Pl. III, fig. 1. His history was obscure; he had been intemperate, but his general health appears not to have suffered at any time till within the last six months, when he gradually failed in vigour and strength, and was not equal to work. There was no evidence of hæmaturia at the commencement of the present attack. He was very ill about three months since. He was well purged with the cream of tartar and jalap, and three days after admission there was considerable subsidence of the dropsical effusion. He took digitalis with the tartrate and bicarbonate of potash with great advantage; for ten days after admission the swelling is described as having entirely disappeared from every part but the ankles.

His breathing was natural, but he complained much of lumbar pain, and of nausea. A few days later the scrotum and thighs again exhibited dropsical conditions. The urine presented the same appearances—granular casts containing renal cells in a state of advanced fatty degeneration; nevertheless, by the beginning of August, he could walk for an hour or two without any swelling of the ankles. He was placed now on the citrate of iron and ammonia. His condition rapidly improved—he gained strength; the urine, however, still contained albumen, but in very small quantity. After being six weeks under treatment, and feeling in better health than for months past, the anasarca having entirely subsided, he requested to be dismissed. He was told if at any time his symptoms returned, or he became again out of health, that he could be readmitted.

I felt sure, from the microscopic condition of the urine remaining unchanged, notwithstanding the disappearance of the dropsy, and the general amendment of his health, that he had obtained but temporary relief. But he continued able to do light work from September, the period of his discharge, to the month of February, 1857, when he was again admitted, suffering from an aggravation of the symptoms of the previous July. There was now considerable febrile disturbance. The tongue was thickly coated. The face was œdematous, and the eyelids swollen with serous infiltration. The respirations were hurried, and there was cough with expectoration of a thin mucoid fluid. The pulse was 100. There was much thirst, and loss of appetite, the temperature of the surface of the body was not elevated. There was extensive anasarca of the lower extremities, extending to the abdomen, but there was no evidence of ascites. The patient stated that he had been free from dropsy from the time he left in September till within the last two days; but that he constantly suffered from giddiness in his head and pain in the occipital region of the scalp. He was also troubled with frequent nausea and even with vomiting. He had not noticed any blood in his urine, but it had lately become very scanty and high coloured, and he was troubled with a frequent desire to pass it. The state of the chest implied an œdematous state of the lungs:

the heart's sounds were feeble but natural. The urine was of a sp. gr. 1·020, high coloured, and deposited a coarse flaky albumen by heat and nitric acid. The febrile condition was allayed by ammoniacal salines,—the Mistura Ammoniæ Acetatis with Sp. Ætheris Nitrici; and he was well purged at first with the compound jalap powder, and subsequently with the compound gamboge pill. In a few days the febrile symptoms subsided, the pulse became natural, the tongue clean, the thirst disappeared, and the dropsical state of the surface materially abated. He suffered, however, from such constant vertigo and pains in the head, accompanied by nausea and vomiting, that apprehensions were entertained that symptoms of uræmic poisoning would develope themselves. The urinary casts, however, did not differ in character from those first represented. The urine continued moderately albuminous. I was convinced from the appearance of the deposit that degeneration was progressing in the kidneys, and probably in other structures of the body. He took the tincture of the sesquichloride of iron in fifteen-minim doses with apparent advantage.

Between the 6th of March and the 25th, he ceased to make satisfactory progress. The œdema returned for a day or two, there was some febrile disturbance with thirst; these symptoms abated—again returned. On the 25th, no report having been made for six days, the ward-book states, that since the last report the condition of the patient has apparently improved. The anasarca had not returned for six days; the urine was still albuminous, and the deposit as before. He thought himself so much better that he wished to go out on the following Tuesday. At nine o'clock on the evening of the 26th, Mr. Perreau my clinical assistant, who carefully watched the case throughout, was sent for and found him in a fit of apoplexy. The predominating symptoms were, pallor of the face; a flickering, scarcely perceptible pulse; stertorous breathing; pupils very much contracted, the right leg and arm being paralysed; there were no convulsive movements; deep coma with stertor prevailed; and he died four hours after the seizure.

A post-mortem examination was made sixteen hours after death. The surface of the body was slightly anasarcous. An effusion of loosely coagulated blood was found in the substance of the pons varolii, from whence it passed behind the medulla oblongata. Blood was also extravasated into the fourth ventricle. The arteries of the base of the brain were opaque and rigid, the larger ones even quill-like; some small branches contiguous to the seat of the hæmorrhage were teazed out with needles, and the microscopic appearance is represented Pl. III, fig. 6. The lungs were of ordinary appearance, the bronchial mucous surface being pale, a few old pleuritic adhesions existed on the left side. The heart was natural in size, the valves healthy, its muscular structure appeared paler than in a well-nourished heart. The pericardial surface was marked with a few opalescent patches (maculæ albidæ). The kidneys were of increased size, lobulated, weighed severally eight and a half and nine ounces; in colour they were of a pale flesh tint; when the capsule was removed, the entire outer surface was seen covered with minute stellar spots, arising from an arborescent or star-like disposition of the blood-vessels on a surface finely granular. A section displayed the cortical part of a pale tint, contrasting forcibly with the striated deeper coloured pyramids. The pale cortical portion surrounded them and seemed in progress of supplanting them, as the base of the pyramids was ravelled out in a fan-like expansion, the white granular deposit appearing to invade the straight tubular structure of the cones.

The microscopic deposits in the urine in this case are full of practical and useful instruction. From the first day the patient came under observation they told of a degeneration which would ultimately pervade the entire organ, and perhaps invade other tissues of the body. The earliest period of the failing health of this man did not come under my observation: he had been out of health for six months previously, and had some attack, the exact nature of which could not be made out, three months before his admission into the Hospital. It must be evident from the character of the urinary deposit when first examined in July, that renal disease had been making progress for some time. The finely granular tubes with free nuclei, the abortive and fatty epithelium, were too expressive of renal disorganisation to leave any doubt that the disease could be of any very recent date. An unfavorable estimate was at once formed of the ultimate recovery of this patient; but the sequel shows how much may be effected by treatment. The remedies exercised a most beneficial influence, first, in removing the dropsy, and, secondly, in so ministering to the improvement of the general health of the patient, that some months were passed in comparative freedom from inconvenience or distress; and it may be presumed the progress of the disease was during this interval retarded. For five months he stated that he had been free from dropsy. The disease, however, returned in February. It must be assumed that the urine continued throughout albuminous, more or less. The urinary sediment in February did not differ in character from that previously passed, except that the casts were less granular and more fatty (fig. 4), unequivocal evidence of the advance of the disease. Nevertheless, remedies again temporarily removed the dropsy, and with it the more distressing symptoms of the patient. He appeared to be progressing favorably, excluding the deposit in the urine, and the inference to be drawn therefrom—a recovery seemed probable. He was seized with apoplectic symptoms, and he died of cerebral hæmorrhage. The termination of this case illustrates, that fatty degeneration of the kidney is not a partial or local disorder, its presence in these organs implies a greater or less disposition to decay in every part of the organism.

Post-mortem observation teaches that the heart fibre and the arterial textures ultimately participated in this fatty decay. It is in these tissues that the effects are most sudden, serious, and fatal. We have not evidence to show that these textures are more predisposed to fatty degeneration than others, only that altered states of nutrition in these tissues, more immediately lead to fatal results. The muscular fibre of the left ventricle of the heart exhibited traces of fatty degeneration. (Pl. III, fig. 5.) Fig. 6 represents the fatty condition of some of the small blood-vessels in the immediate neighbourhood of the cerebral hæmorrhage. The elastic coat of the artery is lost by this fatty deposit, it becomes easily ruptured and torn, and destructive hæmorrhage follows.

The examination of the kidneys showed the extent of fatty and granular deposit which had taken place in the cortical structure of these organs. This had certainly not reached its maximum. It was rapidly invading the pyramids; but these stood out in colour and appearance, a marked contrast to the pale and fatty cortical part. The process of degeneration is always from the cortex inwards. The pyramid or cones are the last to become invaded by the morbid deposit. The epithelium of the straight tubes appears to be little liable to fatty change; the spheroidal glandular epithelium of the convoluted tubes especially so.

Pl. III, fig. 7, shows the epithelium of the calyces and pelvis unchanged. Figs. 8 and 10 exhibit the epithelium of the straight tubes of the cones nearly natural, while the canal of the tube appears choked with granular and fatty deposit, which could be readily squeezed out of the apex of the cone by pressure.

The fatty and granular state of the cortex is represented in fig. 9. The appearances here represented justify the conclusion, that the epithelial cells become detached from the basement membrane, and are impacted in the granular deposit. The tubes are blocked up by the increasing deposit, and while an albuminous fluid may filter through, but little of the exudative matter appears in the urine. This, I think, explains why, in these chronic cases of fatty degeneration, so little epithelium appears in the urine, and to this extent has led Dr. George Johnson to consider them as possessing the character of non-desquamative disease.

The facility with which the epithelium becomes detached when the tubes are teased out, and the outlet made free, is illustrated in fig. 12. The epithelial cells appear agglutinated together, and impacted in fine granular deposit.

## CHAPTER XI.

### MORBUS BRIGHTII IN THE ACUTE FORM IN CONNEXION WITH DISEASE OF THE LUNGS AND HEART — KIDNEYS PERHAPS SECONDARILY DISEASED.

*General anasarca—hæmaturia—albuminous urine—disease of the mitral valve—pulmonary complications—acute and capillary bronchitis—pneumonia—pulmonary apoplexy—death. Kidneys in the early stage of inflammatory engorgement.*

When morbus Brightii proves fatal in the earliest or acute stage, it is either by pulmonary œdema or uræmic poisoning. But these cases are of not so frequent occurrence as those where the fatal issue is the result of inflammatory complications affecting other organs, and especially the lungs and heart.

These are, perhaps, the most common of all the terminations of acute morbus Brightii.

The disease is primarily renal, secondarily pulmonary, and cardiac.

Case XII.—Sarah Fenton, æt. 18, was admitted on March 30th, 1849, suffering from great distress in her breathing, cough, and general anasarca. She caught cold about ten days since. She had some rigors. Her face began to swell. She made but little water, and that very frequently. "It was as dark as blood." Her face was œdematous, turgid, and inclined to lividity. There was anasarca of the lower extremities, extending above the knees. The backs of the hands were slightly swollen. The respirations were frequent and short, 36. The pulse rapid and sharp, 140. The chest was imperfectly resonant—sonorous and cooing sounds were heard in every region;

and moist mucous crepitation all over the chest. The præcordial dulness was not more extended than natural. The systolic murmur was rough, particularly under the left mamma: from the frequency of the heart's action, the diastolic sound could not be measured or distinguished. The abdomen was somewhat swollen, and gave obscure signs of fluctuation. The cough was frequent and harassing, and the expectoration was white and frothy. The temperature of the breath was lower than natural. The urine was loaded with lithates—dark coloured—deep as brown sherry. It was highly albuminous, and contained blood-casts and free blood-corpuscles. As the bowels had not been relieved for some days, an enema was administered, and she took the compound jalap powder. A small quantity of blood was taken from the arm; and she was ordered a diaphoretic mixture, with excess of antimony. The bleeding relieved the chest so much, that she slept quietly for some hours. The next day the respiration was much less embarrassed. The face was less livid and œdematous. The cough was less harassing, and the expectoration was freer, and consisted of a clear, tenacious, viscid fluid, slightly streaked with blood. The temperature of the breath was higher. The fine moist crepitation in each region had somewhat subsided, and a coarser sound was heard. At the posterior part of the right lung there was a spot deficient of resonance, where some inspiratory crepitation was heard. The pulse was very irritable, jerking, and undulating, or unsteady, 140. Respirations, 30. Later in the day the symptoms became more aggravated. The respirations increased to 38, and at the base of the right lung the area of dulness had increased, and the inspiratory crepitation was well marked. Moist mucous murmurs were heard in all the other regions. The face had become again dusky, and the expression was anxious. Urine as yesterday.

The next day the anasarca of the surface had increased; the face was more swollen. The pulse had fallen in power, but increased in frequency to 146; the respirations, 36. The state of the chest as before. Ammonia in a state of effervescence was ordered, and the chest enveloped in hot flannels. On the 3rd of April the dropsy was still on the increase. In the posterior part of the chest the sounds were deficient; but coarse moist sounds were heard anteriorly. The lividity of the face returned; she gradually became comatose, and died on the 4th of April.

A post-mortem examination was made twenty-four hours after death.

There was no cadaveric rigidity. There was anasarca of the whole surface of the body, the areolar tissue being everywhere infiltrated with serum. The abdominal cavity contained a considerable quantity of bright yellow serum. The lungs did not collapse on opening the chest. There was no pleural adhesions. The left lung was gorged with blood; it was spongy throughout, and, on a section, a frothy, blood-stained serosity oozed out in abundance. The upper third of the right lung was of a dense solid consistence, and when a section was made, there appeared, of the size of a hen's egg, a circumscribed, well-defined sanguineous deposit, presenting the usual character of pulmonary apoplexy. In the posterior part of the middle lobe the pulmonary tissue was consolidated into a red hepatised mass—first stage of pneumonia. The bronchial mucous membrane, throughout both lungs, to the minutest tubes which the eye could recognise, was of a madder red colour, and smeared everywhere with a tenacious glue-like excretion.

The heart was enlarged, flabby, and the surface somewhat fatty; exocardium opalescent. Muscular structure pale; the cavities were filled with fluid blood. No coagula. The aortic valves were free and transparent. The margins slightly thickened and the corpora aurantii exaggerated in size.

The mitral valve was thick, rigid, and unyielding. Much fibrinous deposit, as of a succession of layers, rendered its margin stiff and patent; so that during life it must have permanently presented an open ring. The valves of the right cavities were natural. The auricle and ventricle were much distended with fluid black blood. The kidneys were somewhat irregular in shape, having an angular appearance. They weighed more than natural—five ounces and five and three-quarters respectively. The capsule was not adherent, but easily detached, and being removed, exhibited the kidneys of a colour approaching purple madder—perhaps something redder. The surface was decidedly not granular; but was studded over with innumerable red points or dots, which seemed slightly elevated. The internal structure presented the same deep hyperæmic colour; the cones or pyramidal bodies being marked out strongly by deeper and more purple striæ, in lines corresponding to the direction of the tubes of Bellini. The mucous membrane of the calyces and pelvis had a red colour, and was much marbled with aborescent vascularity. The liver presented well-marked characters of deep portal congestion.

There were many features in this case of great pathological interest. It was much to be regretted that we could get no antecedent history. The poor girl was too ill and too distressed in her breathing to justify us at this period of her suffering in fatiguing her with questions, and she had no one with her able to give any satisfactory account of her previous state of health. The disease of the heart, in all probability, was of some antecedent date, and may, without hesitation, be assumed as the remote cause of the various morbid conditions diagnosed during life, and demonstrated after death. The permanent incompleteness of the mitral valve must have been a constant source of embarrassment to the function of respiration. Whatever embarrasses the freedom of the pulmonary circulation, is an obstacle to the current of blood flowing through the right cavities of the heart. Whenever retardation exists at this point of the vascular apparatus, the most efficient and powerful cause of general dropsy is present. For not only is that state of venosity produced and kept up which is most favorable for the development of dropsy, but the functions of those organs which pour their blood direct into the inferior cava are notably disturbed; and where that function, as in the kidneys, is designed for the escape of excrementitious fluid from the blood, any impediment to the secreting activity of these organs is an addition to the dropsy-producing causes.

So that where disease of the mitral valve is associated with such pulmonary disorders, as acute bronchitis, pneumonia, and ultimately pulmonary apoplexy, morbid conditions are brought into operation which exercise an obstructive influence on the current of blood flowing through the emulgent veins, as effective for the development of renal congestion, as was the ligature on the emulgent veins in producing hæmaturia in those poor victims to physiological science, the rabbits, experimented on by Dr. George Robinson. ('Inquiry into the Pathology of Granular Disease of the Kidney.') But it must be observed, that the passive congestion induced by impediments to the free current of blood through the heart and lungs, is not of itself sufficient to excite morbus Brightii. The kidneys were an interesting example of the earliest stage of inflammatory hyperæmia in morbus Brightii. They were not simply congested—passively—by the impediments in the flow of blood through the great venous trunks. No doubt these circumstances materially aggravated the renal disorder. But the rigors, followed in a few hours by œdema of the face, with scanty, high coloured, and blood-stained urine, marked with unquestionable certainty the epoch of renal hyperæmia, and its origin in exposure to cold and wet, the most common of the exciting causes of acute morbus Brightii. The microscopic appearances observed in the kidneys were very interesting. The minute red specks on the surface, and in the cortical part of the kidneys, were the Malpighian bodies filled with effused blood. (Plate IV, fig. 5.) The convoluted tubes seemed filled also with coagulated blood, and the straight tubes of the cones presented an appearance of being filled with granular casts apparently derived from the secreting portion of the organ. The complications observed in this case are exactly those which hypothetically might be assumed as likely to become developed by, and to succeed to, disease of the mitral valve. The rapidity and formidable intensity, however, with which they proved fatal, must be attributed rather to the accidental exposure to cold and wet, and the succeeding symptoms of renal engorgement and dropsy, than directly to the disease of the heart. This doubtless favoured and abetted the activity of the pulmonary mischief. But it was not the cause. When it is recollected that pulmonary complication is almost inseparable from acute morbus Brightii, and that it is rare to witness this form of disease without bronchitis or pneumonia, or even both, more or less intense, being developed during its progress, we shall have less hesitation in referring these inflammatory complications to the peculiar dyscrasia inseparable from renal disease, rather than to the mechanical influence of an obstruction caused by the imperfection of the mitral valve. Regurgitation of blood from the ventricle into the auricle at each systole, is the immediate result of this imperfection of the valve; the blood becomes embarrassed in its passage from the lungs to the heart; and pulmonary congestion follows. Hæmoptysis and pulmonary apoplexy, which are the usual attendants on pulmonary engorgement from this cause, may, without difficulty, be traced to the obstructed circulation through the lungs. The current is impeded, and it must either overflow its channel, or burst through its walls. But, for the development of bronchitis or pneumonia, no such mechanical explanation will suffice. These diseases can only arise from special qualities which the blood itself has acquired; and the inflammatory process, whether in the pulmonary or other tissues, is explicable only by reference to alterations in the vital properties of this fluid. We witness its free passage through the capillaries arrested; unequal or irregular movements of the corpuscles are seen; they cohere together, or adhere to the wall of the vessel; and this stagnation or interruption leads to transudation of the plastic element of the blood, and consequences follow which a mere mechanical impediment to the freedom of the circulation, operating from a distance, could not possibly bring about.

I conceive, therefore, that an obstruction in the current of the circulation from the lungs through the heart, competent as it may be to overload the lungs with blood and embarrass their functions, cannot of itself induce inflammatory action, although doubtless inflammation, once excited, is rendered more active and intense by whatever favours the accumulation of blood in the affected part. If, therefore, it be conceded, that disease of the mitral valve cannot of itself produce inflammatory diseases of the lungs, still less efficient will it be as a direct agent in causing inflammation of the kidneys. Yet, as in the lungs, if an inflammatory state of the kidneys coexists, an impeded current through the cava and right side of the heart will add to the adverse conditions, and hasten the disease to a fatal termination.

The following case will prove that disease of the mitral valve may exist for a lengthened period, and ultimately prove fatal through pulmonary inflammation, liver disease, and dropsy, without the kidneys being implicated further than by passive congestion.

Case XIII.—Henry Piercy, æt. 44, calling himself a porter, but getting a precarious livelihood by carrying messages and sweeping a crossing, well known to the inhabitants of this neighbourhood, was admitted into Burdett Ward, February 20th, 1857. The aspect and general condition of this patient presented many features of interest. He was deeply jaundiced. The conjunctivæ were not only of a golden yellow, but extensive ecchymoses of blood covered the lower half of the eyeballs, and even the inner folds of the eyelids. The whole surface of the body was anasarcous, the lower extremities most so; the wrists and back of the hands were also œdematous: and the abdominal cavity afforded evidence of considerable dropsical effusion. The countenance of the patient was distressingly anxious. The respirations were frequent—short and gasping. The pulse was very small and thready. The mobility of the chest seemed reduced to a minimum: both sides were deficient in clearness of sound anteriorly. Posteriorly and laterally, both sides were dull, and dry fine inspiratory crepitations were equally marked on both sides. The heart's systole conveyed a harsh and grating murmur, but the frequency of its action and its feebleness did not at this period convey any very marked indications of disease. The cough was distressing from its uninterrupted frequency, and the sputa were gouts of blood, or mucus so deeply tinged that it could not be distinguished from them. This patient had been under my notice for some years past. He suffered every winter from severe paroxysms of difficulty of breathing; in fact, the slightest catarrhal affection of the bronchial mucous membrane was always accompanied by severe dyspnœa. During these attacks I had become cognisant of the presence of disease of the mitral valve, which caused a coarse grating murmur to accompany the systole—heard distinctly at the apex and to the left side of the heart, less audible at the base and to the right. His habits of life had not been calculated to promote either health or longevity; yet it could not be said that he was a drunkard. It was much to his credit that some gentlemen in this neighbourhood took great interest in his fate, and it spoke well for his character that they had employed him on odd jobs for years. The remedies employed were of no avail; he lived but forty hours after his admission.

The body was examined twenty-four hours after death. The cuticular surface was everywhere stained of a rich bile-yellow hue, and the whole body was anasarcous. The lower extremities had a purplish colour, from the amount of venous distension, and a few vesications existed on the ankles and tibiæ, containing a bright yellow serum. The abdominal cavity was much distended with fluid of the same orange colour. On opening the chest the lungs scarcely collapsed. There were old pleuritic adhesions, very dense in structure, in the left cavity. The right lung was free, of a sodden feel and leaden hue, and was distinctly œdematous on pressure, but this only related to the anterior aspect; for, on removing the lungs, several detached, consolidated masses were felt. There were two or three in each lobe, and they equalled in size a hen's egg—a section of these consolidated portions of lung substance displayed them of a dark brown red colour, and they presented something of a character of patches of pulmonary apoplexy, yet they wanted the well-defined border of that form of pulmonary hæmorrhage, for their margins seemed gradually to merge into the surrounding tissue. There were as many as eight of these isolated masses of pulmonary engorgement. In the inferior lobes of both lungs, and located at the extreme posterior border or edge of the lung, were two patches of consolidation which possessed all the characteristics of the red hepatization of pneumonia. On the pleural surface immediately contiguous to these spots, patches of recently effused gelatinous lymph were seen. The bronchial mucous membrane throughout was stained of a deep madder red. The heart was much enlarged, it weighed sixteen ounces and three quarters. On the exocardial surface near the apex was a small patch of recent lymph. Towards the base two *maculæ albidæ* were noticed. The walls of both ventricles were remarkably thick, and the cavities equally enlarged. So dense and firm were the chordæ tendinæ, that they appeared like white cat-gut. The valves of the aorta were free, but considerably thickened, and one was sufficiently pouched to cause some obstruction to the flow of blood in the direction of the aorta; some atheromatous deposit was seen in the aortic sinus. The mitral valve was so diminished in extent, that it presented an opening scarcely larger than a small button-hole. The margin of this opening felt hard and bony, and resisted the knife with a grating earthy harshness. The wall of the right ventricle appeared to equal in thickness that of the left! The columnæ carneæ were extravagantly large and thick. The pulmonary valves were healthy. Both auricles were dilated to a capacity equal to twice that of the ordinary standard. All the cavities were filled with black fluid blood, without coagula. The liver was gorged with blood, and the deep bile-tint with which the acini were stained gave the organ a peculiar orange-purple tone, inclining to yellow. The congestion was dependent on the accumulation of blood in the portal vessels.

The kidneys were in every respect natural, except that they were gorged with venous blood; their colour, when first removed, was of a madder red; this soon disappeared on a section being made; and when examined two hours afterwards, the appearance of venous turgescence had left them, and with the aid of the microscope the convoluted tubes of the cortical part, as well as the straight tubes of the cones, presented all the character of health. (Plate IV, fig. 6.) This patient had been under observation for at least six years. During the whole of this period he was known to have disease of the mitral valve. The aggravation of all catarrhal attacks, and the dyspnœa which accompanied them, were attributed correctly enough to this cause; but no indication at any time existed of a disposition to renal disease.

Renal disease *may be* connected with disease of the heart, as in Case XII; but it is by no means so necessary or certain a sequence as pulmonary or hepatic disorder. Reasoning hypothetically, nothing appears indirectly to minister to renal engorgement so effectually as obstruction to the circulation through the left cavities of the heart, which in succession affects the lungs, the right cavities, and eventually leads to retardation of blood in the cava, its influence extending ultimately to the remotest parts of the venous capillaries: thus cardiac dropsy may be produced. But observation and experience both teach us that something more is requisite for the development of morbus Brightii than simple passive venous congestion. A special disposition or diathesis, a peculiar divergence or disturbance in the vital energies or forces, strongly expressed in the altered qualities of the blood and equally so in the deterioration of cell-growth within these organs; and further exemplified by the rapid disintegration or breaking up of these abortive cells, and the accumulation within the tubes of their granular and fatty contents. The origin of such pathological conditions must be sought in causes far more remote than disease of the mitral valve, which, while it ultimately leads to an impeded venous circulation and general dropsy, does not necessarily implicate the kidneys in any of those forms of disease which terminate in degeneration of their structure.

## CONNEXION OF MORBUS BRIGHTII WITH INFLAMMATION OF THE LUNGS, AND GRANULAR DEGENERATION OF HEART-FIBRE.

*Anasarca of the lower extremities, scrotum and thighs—Pneumonia—Death two days after admission—Splenification of the lung—Fatty state of heart-fibre—Kidneys dark madder red throughout—First stage of inflammatory engorgement—Tubes filled with granular exudation.*

The character and symptoms of cases of acute renal dropsy have much in common. They differ from each other in little but in the intensity or rapidity of their course, or the stage at which the fatal catastrophe takes place. These observations are applicable chiefly to the unchecked career of those cases which are neglected, or which come under treatment at a period too late to arrest the vehement progress of the disorder. The tractability of these cases greatly depends on the period at which treatment commences. In the more acute forms of the disease the delay of twenty-four hours may permit such inflammatory complications to gain force, as to preclude all hope of arresting the disease. In hospital practice it is commonly observed, in those cases of renal dropsy fatal in the earliest stage, that the patient has remained at home, and has not sought medical assistance for some days; and only when serious and aggravated symptoms, more particularly in relation to the chest, come on, that he seeks aid from an hospital.

Case XIV.—The case of Charles Crisp, æt. 25, will illustrate these remarks, and it will add another example of the state of the renal tubes, filled and choked with granular exudation in the early stage of inflammatory engorgement. Another point of interest is, that notwithstanding the high state of hyperæmia, and the proofs afforded by a microscopic examination of the inflammatory state of the kidneys, that there had been during life no hæmaturia; so that the absence of this symptom does not necessarily lead to the conclusion, that the first stage of Bright's disease is not one of inflammatory engorgement.

The patient, on admission, April 15th, 1856, stated that he had suffered from cough and shortness of breath for nearly a fortnight; that he had gone about as usual, but that a few days since, noticing the swelling of his face to be increasing, and that his breathing became worse, he came to the hospital for relief. He complained of a severe post-sternal pain, frequent cough, great shortness of breath, and swelling of the lower extremities.

The mobility of the chest was very limited. Anteriorly, the resonance was equal in the corresponding regions. Posteriorly, below the inferior angle of the right scapula and to the right there was a spot of deficient resonance, and over which a deep breath developed fine inspiratory crepitation. The respirations were 50, and the pulse 120. The expectoration was viscid, frothy, and of a deep plum colour. The urine was high coloured, sp. gr. 1·021, albuminous, and the sediment examined, by the microscope, exhibited some granular casts containing epithelial cells, a few scattered blood-discs, and some amorphous flakes stained with hæmatin. The dropsical swelling did not extend above the knees. The scrotum was anasarcous, and the face slightly puffed. He was bled from the arm with some relief to the respiration, and he took potassio-tartrate of antimony and opium, in half-grain doses.

The next day, the 16th, the area of dulness had increased; no crepitation could be heard, but tubular breathing was present, as well as bronchial transmission of the voice through the stethoscope. There was no mitigation of the symptoms, the respirations became fuller and more frequent, the face became dusky, and he died on the evening of the 17th.

The body was examined eighteen hours after death. There was anasarca of the lower half of the body. The right lung was adherent to the ribs by old pleuritic adhesions; the left lung was free. On a section being made of the right lung, except at the apex, it was throughout its extent of a consistence less dense than what is represented by the term hepatization; it was of a colour approaching a purple madder, and it exhibited the character of what has been called splenification of the lung.

At several spots some greyish granules were observed, indicating that the secondary stage of the pneumonic process had commenced. There was no evidence of inflammatory action in the left lung; it was, however, gorged with blood. The bronchial mucous membrane throughout the right lung was highly injected, swollen, and covered with a frothy prune-juice coloured exudation. The cavities and valves of the heart were natural, the exocardium had an opalescent appearance, and one or two maculæ albidæ were visible. The muscular fibre from the walls of the left ventricle exhibited the characters of granular degeneration. (Plate IV, fig. 10.) The kidneys were increased in size and weight; they weighed seven ounces each. They were of a purplish brown red colour, and a section displayed the same colour within. The capsule was easily detached, though at one spot it was slightly adherent. The cortical surface was marked with star-like and arborescent vascularity. The cones were deeply striated, of a purple red colour. With the aid of the microscope the tubes of the cortical part appeared filled with a fine molecular exudation, in which a few scattered blood-corpuscles were seen. The epithelium was in many parts detached from the basement membrane, and the individual cells appeared very granular. Even under the microscope, with a strong light, all parts had a brownish red tint.

The kidneys, in this case, represent also the early stage of inflammatory engorgement, and the commencing period of exudation. The tubes were filled with a fine molecular matter, which I conceive to be the product of the inflammatory stasis. Much cell-structure had disappeared, and its place occupied by this exudation. Can that finely granular material which chokes the tubes be derived from the disintegration of the epithelial cells? Or is it a specific transudation, as in pneumonia—an inflammatory product, causing destruction of cell-structure by its presence? This latter view is the most probable. The molecular exudation or deposit is at first highly stained with the colouring matter of the blood, so that the kidneys at this stage have a deep brown red colour. The microscope shows that this arises from the tinting of the exudation, rather than from simple congestion of the blood-vessels. The colour rapidly disappears, and the exudation assumes a yellowish brown, and eventually a light fawn, or even lighter colour, proportioned in respect to intensity to the interval between the period of inflammatory engorgement and the fatal termination. It may be assumed as tolerably correct that in acute morbus Brightii the kidneys will be paler, the more protracted the case. Similar changes take place in the exudation choking the air-cells in pneumonia. The red hepatization is this exudation highly stained with hæmatin. The grey hepatization represents that stage where the colouring matter has been removed. In pneumonia the exudation is not interstitial, or only rarely so; it is into the air-cells and minute twigs of the bronchial tubes that the exudation is poured. So in morbus Brightii, the exudation rests in the convoluted tubes of the cortex and in the Malpighian bodies. It is, perhaps, only in purulent nephritis that the exudation is interstitial; but in that disease the symptoms during life have nothing in common with renal dropsy. The exudation in pneumonia rapidly undergoes purulent change, the exudation in acute renal disease less so, or only partially; but that pus-cells are produced, though not in abundance, accompanied by compound granule-cells, is seen by reference to the casts represented in Plate IV, fig. 11.

## CHAPTER XII.

### RELATION OF THE HYALINE, TRANSPARENT CASTS TO THE EARLY AND REMEDIABLE STAGE OF MORBUS BRIGHTII.

It has been already shown that the early period of renal degeneration, whatever be the form, commences in a state of hyperæmia, or inflammatory engorgement of the renal tissue.* One or both organs become infiltrated with a sero-sanguinolent fluid, which transudes through the walls of the tubes, receiving an accession of blood from the rupture of some of the Malpighian capillaries; which hæmorrhage, coagulating in the tubes, is subsequently washed from them by the urinary current, and appears in that fluid, when voided, as fibrinous casts, stained with hæmatin, and entangling at first, blood-discs only: epithelial cells soon become mixed with the exudation—these, at the commencement, present no other than a healthy appearance—mixed in small proportion with compound granule-cells. In favorable cases the cast or cylinder in which they appear lodged becomes more and more transparent, and here and there an isolated cell, or a few scattered nuclei, mark the subsidence of the renal disorder. If, however, the disease progresses, the epithelial cells undergo manifest alteration in development; compound granule-cells become more numerous, and fat, aggregated in grains or in scattered groups, increases in the tube-casts. These changes in the character of the tube-casts, if carefully observed, will be found a safe guide for an estimation of the direction and progress of the disease. In the inflammatory stage of morbus Brightii the blood-stained aspect of the urine is partly derived from direct hæmorrhage—that is to say, from rupture of the capillary structure of the Malpighian tufts; hence the liquor sanguinis and blood-corpuscles pass directly into the tubes, coagulate there, and afterwards appear in the urine. But the disproportion existing between the number of blood-corpuscles and the coagulated fibrine on the one hand, and the intensity of the colouring matter and the amount of albumen on the other, forbid us to suppose that the constituents of the blood so disproportioned can be only derived from one source—the rupture of the Malpighian capillaries. Those disproportioned elements, then, which cannot be accounted for by direct hæmorrhage, must be referred to the transudation through the renal tissue of the blood-stained sero-albuminous elements, in the same manner as sanguinolent exudation takes place through the walls of the air-cells in pneumonia, without direct rupture of the capillaries. The state of the kidney in those rare cases in which death takes place in the early stage of inflammatory engorgement affords, I think, presumptive evidence that such transudation of the blood-stained serum does, in fact, occur. The entire organ in these cases is infiltrated with a madder-red sanguinolent fluid; every part of the organ displays the deep discoloration of blood-stasis; the pyramids are streaked with purple-red lines, and the mucous membrane of the calyces and pelvis is of the same dusky hue. The slightest pressure causes a thin blood-stained fluid to ooze from the apex of the cones, and in a section of the organ a turbid, thin, sanguinolent serum drips from the cut surface. In these fatal cases this state of engorgement has doubtless reached its maximum; but I am inclined to think, that in all cases of hæmaturia caused by inflammatory engorgement a similar condition of kidney exists, differing only in degree from that just described. As the hyperæmic state of the kidney subsides, the urine becomes free from all trace of blood, the blood-corpuscles disappear, the albumen diminishes, the fibrinous casts of the tubes are replaced by casts containing epithelial cells; these become fewer, more and more transparent, less and less granular, and ultimately disappear, the urine for some time after containing, here and there, isolated epithelial cells, probably from the larger straight tubes. Such is the progress which favorable and tractable cases exhibit as to the character of the exudative material thrown off from the kidneys. The following cases will illustrate these views.

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* Subsequent experience has caused me to modify this opinion to some xtent, as will be seen by reference to the chapter on Chronic Albuminuria.

### *Hæmaturia—albuminuria—dropsy. Recovery.*

Case XV.—J. Hancook, æt. 56, a carman. This patient was admitted into Burdett Ward, March 19th, 1856, suffering from some trifling febrile disturbance, with headache, occasional cough and expectoration of a catarrhal mucus, occasional dyspnœa, frequent desire to make water, blood-stained urine, œdema of the feet and ankles, puffiness of the eyelids and back of the hands, loss of appetite, and thirst. The aspect of the patient was not unfavorable, having the fresh-coloured look of one whose avocations were in the open air. The chest was resonant, mucous murmurs, with cooing and wheezing sounds were heard, both anteriorly, laterally, and posteriorly. The heart's sounds were natural; the pulse full and hard; the tongue pale, and slightly coated; the urine was deficient in quantity, blood-stained, and highly albuminous; micturition frequent, particularly during the night. There was pain and weight felt across the loins, but percussion and pressure did not aggravate these symptoms. The patient stated that he had been ill about a fortnight, dating the commencement to exposure to cold at night. He felt chilly and feverish on going to bed, and in the morning he found his eyelids stiff and swollen, his face puffy, his ankles and feet swelled, as well as the back of his hands. He noticed the frequent calls to make water and the bloody appearance of the urine, which not giving way he applied for admission. He appears to have enjoyed average good health. He states his habits to be temperate; but he appears to have been singularly a sufferer from accidents, as he has suffered fracture of the leg three times, and once fractured his ribs. The urine was of a dark madder-brown hue; some undissolved lithathes rendered it turbid, but on warming, these were taken up. Before reaching the boiling point copious coagulation took place. The specific gravity was 1·020.

Plate V, fig. 1, represents the tube-casts on the first examination of the urine the day after his admission. As the hæmaturia was of a fortnight's duration, and according to the statement of the patient, was less bloody than it had been, there were but few casts of coagulated fibrine. The greater part of the deposit consisted of granular casts containing healthy epithelium, and a few scattered isolated blood-discs. He was cupped from the loins to ten ounces. He took the cream of tartar and jalap purgative, and he was ordered a simple diaphoretic saline. The purgative acted copiously. On the fourth day from admission the œdema of the face and upper parts of the body had disappeared, the cough was not troublesome, and the state of the chest implied that the catarrhal condition of the bronchial tubes had yielded. The urine was scarcely tinged with blood, more abundant, and less frequently passed. It was, however, still highly albuminous. Examined under the microscope on the 24th, the appearances presented by the deposit are represented in fig. 2. The casts are very transparent, one slightly granular. He was this day ordered the sesquichloride of iron, in ten-minim doses, three times a day, and the cream of tartar purgative twice a week, or as frequently as the state of the body required. The anasarca of the feet and ankles subsided, and no vestige of any dropsical effusion could be observed on the 1st of April. On March 30th the microscope showed the appearance represented at fig. 3, and on April 4th those in fig. 4. The urine had become natural in appearance. On March 30th a slight haziness was produced by heat and nitric acid; but on the 10th of April no trace of albumen could be detected. On the 14th of April the man declared himself sufficiently recovered to go to his work, and, as the subsistence of his family depended on his exertions, he was discharged. For greater security against a relapse, it would have been desirable to have kept him in the hospital a week longer.

This case confessedly represents a very mild type of the disorder. Dr. George Johnson would call it a case of desquamative nephritis, Rayer albuminous nephritis; but call the symptoms by what name we will, they are unmistakeably those which characterise the early stage of Bright's disease. The bloody urine, the dropsy, the tube-casts, are unequivocally the initiatory conditions of that intractable disorder. But a carful study of the casts throughout the attack did, I think, justify the favorable prognosis I ventured to offer while the case was under observation.

I am convinced from this, as well as from Welch's case, and many others of like character, that when these hyaline casts make their appearance immediately after the first or inflammatory stage of the disorder, a favorable opinion may be entertained of the result.

Case XVI.—John Welch, æt. 39, a stone-mason, residing at Woking, in Surrey, was admitted December 24th, 1856. He stated that he had been ill about six days, suffering from pains in the chest, slight dyspnœa, cough and expectoration of catarrhal mucus. Pulse full. The chest was resonant, but moist mucous murmurs were heard all over the chest. The heart sounds were natural. There was slight œdema of the lower extremities; and he complained of pains in the left lumbar region. The urine was moderate in quantity, high coloured, sp. gr. 1·018, deposited lithates, and contained albumen. The patient was a strong, well-made man, with a healthy aspect. He attributed his present illness to exposure to cold, having got wet through—followed by chilliness, pain in the chest, dyspnœa and cough. His habits appear to have been temperate. He was bled, and took diaphoretic salines. In four days the chest symptoms had subsided; the cough was less frequent; and the expectorations an ash-grey, tenacious mucus. The lumbar pains continued, and the anasarca of the feet and ancles did not subside The first microscopic examination of the urine was made January 2nd. (Plate V, fig. 7.) Fibrinous casts containing blood-discs, one very transparent; other faintly granular casts containing granular cells—a few free nuclei, and a blood-disc or two in the tube. The urine was free from lithates, was albuminous in a moderate degree, and sp. gr. 1·018. He was cupped from the loins, and continued the diaphoretic. The œdema rather increased than otherwise; for, on the 3rd of January, the scrotum was infiltrated with serum. The cupping was repeated on the 7th of January, with relief to the pain in the left lumbar region, and the following day spontaneous diarrhœa occurred. The urine became less abundant, and again deposited lithates, but the anasarca considerably diminished. On the 15th of January the urine was of a slight cherry-red colour, and evidently contained blood; the microscopic examination demonstrated granular casts, containing a few blood-discs, and numerous free blood-corpuscles (fig. 8). But the casts were so slightly granular, that but for the granule-cell and epithelium they might have been overlooked.

He was again cupped, and took the gallic acid. On the 20th of January the anasarca had entirely disappeared. The respiratory sounds and movements were healthy. The pulse was soft and natural; and but for the albuminous state of the urine, he might have been pronounced convalescent. The urine was more abundant, sp. gr. about 1·015. The casts were completely transparent, although a blood-disc or two was observed in several of them; free nuclei in the casts were also visible, and a few abortive epithelial cells (fig. 9). The transparency of these casts about equalled that of the mucus of ordinary bronchial catarrh.

Notwithstanding the favorable progress which was apparently taking place, on the 2nd of January, without any assignable cause, the urine became suddenly charged with a blood-red colour; there was accompanying feverishness, loss of appetite, and hot skin. Œdema and stiffness of the eyelids, and puffiness of the backs of the hands and ankles, preceded by a few hours this return of hæmaturia. The urine microscopically examined, presented the ordinary conditions of this stage—a return of fibrinous casts and free blood-corpuscles. He was briskly purged with the cream of tartar and jalap, had a warm bath, and took the diaphoretic mixture. On the 29th of January the urine was albuminous, but free from fibrinous casts. He had greatly improved—there was no febrile disturbance, and he was ordered the tincture of the sesquichloride of iron in ten-minim doses.

Day by day, from this date, the urine became less and less albuminous. On the 5th of February the urinary casts were transparent, with a few scattered free nuclei and granule-cells. These casts became true hyaline cylinders, the only material accompanying them being minute resplendent granules, which I have always considered to be the nuclei of some unformed or broken-up cells. On the 16th of February the patient was convalescent. The anasarca had disappeared; the urine was clear, containing but the faintest trace of albumen, sp. gr. 1·016.

After the most careful examination on three occasions of many samples, no casts of any kind could be discovered. A few scattered granule-cells, some abortive epithelium, and some pavement epithelium, were only visible. He continued under observation till the 2nd of March; the urine at that date was free from albumen, and from all trace of cylindrical casts—a few isolated cells, as at the last examination, were still seen.

This case would be viewed by some as one of inflammatory dropsy; where exposure to cold arrests the cutaneous function, and leads to inflammatory engorgement of the kidney, febrile symptoms, anasarca, hæmaturia, and albuminous urine. Dr. Handfield Jones ('Pathological Anatomy,' p. 597) believes that there is no more connexion between this state of hyperæmia or inflammatory engorgement of the kidney, and the truly degenerative process of morbus Brightii, than between an attack of bronchitis and succeeding pulmonary phthisis. But the analogy I think, cannot be sustained. In bronchitis the inflammatory process is strictly limited to the bronchial mucous membrane—the parenchyma of the organ is not involved—hæmorrhage never takes place, or, if a streak of blood appears in the expectoration, it results rather from the strained efforts of coughing, than from any hæmorrhagic condition of the part. Pneumonia presents features of greater parallelism with inflammatory engorgement of the kidneys. The croupous or fibrinous exudation into the air-cells is always accompanied by the elements of the blood; and, before purulent liquefaction commences, this fibrinous exudate bears a striking resemblance to the fibrinous and granular material of the tubes in the stage of inflammatory engorgement of the kidney. When the inflammatory exudation in pneumonia is interstitial as well as vesicular, we know that tubercular deposit may follow, and thus an analogy between the degenerative processes in the pulmonary tissue with those of the kidney might be sustained.

All other conditions being equal, all other symptoms and circumstances being the same, are we justified in excluding this case of Welch from the category of morbus Brightii, because the disorder is arrested, and stops short of that degenerative process which follows so frequently in cases with every other symptom in common? In what, it may be asked, except in the intensity and rapidity of the disease, does the case of Osborn (Case VII) differ from this? The general symptoms were the same, differing only in degree. The urinary sediment in the period of the hæmaturia, differed but little; but this sediment, in the former case, day by day furnished proofs of the rapid degeneration of the epithelium; while in the latter, that of Welch, the casts became more and more transparent, more allied to a simple catarrhal exudation, and indicated a satisfactory approach to the restoration of the healthy functions of the kidney.

Where the casts, after the stage of hæmaturia has subsided, rapidly lose their granular aspect, and become more and more transparent, and the structures associated with them are but a few scattered free nuclei and granular cells, then from such characters in the urinary sediment a favorable prognosis may be safely entertained. So far from these hyaline cylinders being moulded in tubes that are deprived of their epithelium, it appears to me that epithelial cells are as essential to the formation of this product as they are in any form of mucous catarrh; and that in these cases these transparent cylinders, when they occur soon after an attack of hæmaturia, may be accepted as a sign that the disease is passing off in the form of what might be called a renal catarrh. Plate V, figs. 5 and 6, catarrhal sputa.

CASE XVII.—Joseph Staunton, æt. 38, a wood-cutter, of reputed temperate habits, was admitted December 23rd, 1856, with slight anasarca of the ankles and feet, and puffiness of the eyelids and face; there was some bronchial catarrh with moist sounds all over the chest. The urine was moderate in quantity; it was clear, had a sp. gr. of 1·018, and contained albumen; micturition was frequent, particularly at night. He stated that the commencement of his illness was about three weeks since, when he had rigors followed by burning heats and perspiration, with cough and expectoration. He did not notice his water whether it contained blood or not; he recollects that he was much troubled at night by a frequent desire to pass it. His legs swelled, but the swelling disappeared when he lay down. As he did not get better he applied for admission. The aspect of the patient was by no means characteristic of albuminuria.

The microscopic examination of the urine on January 4th, 1857, revealed very transparent casts, containing a few epithelial cells, and one or two compound granular cells, with numerous free nuclei. On admission he had warm baths, the compound jalap powder, and the ammoniated saline mixture. The bronchial symptoms quickly abated; the anasarca disappeared after the first week—the urine became more abundant, less frequently passed, and but for the albuminous state of this fluid the patient would have been pronounced convalescent. He was ordered the tincture of the sesquichloride of iron, and digitalis.

On the 19th of January the urine was still slightly albuminous, although the anasarca had disappeared nearly a fortnight, and the sediment presented some transparent casts, whose outline was rendered the more visible by the resplendent granules, or free nuclei, which they contained. A very few isolated compound granule-cells, with a crystal here and there of oxalate of lime, were also observed in the sediment. Before he left the hospital it was ascertained that this patient had suffered a similar attack to the present about four years since, commencing with symptoms of catarrhal fever, and terminating in swelling of the legs; and he moreover stated that he distinctly recollected that, at seven years old, after an attack of scarlet fever, he passed blood with his water and that he swelled all over.

May not these facts show that there was a kind of constitutional predisposition to renal disturbance, originating probably in the secondary conditions following the scarlet fever. We find this patient, not otherwise unhealthy, upon two occasions, after slight exposure, suffering from anasarca, and with the greatest probability albuminous urine in the former as in the recent attack. In the interval of four years his health has been uninterrupted. I cannot conceive that any form of chronic disease has been silently progressing during that interval. The microscopic evidence from the urine, and the favorable and speedy subsidence of the constitutional symptoms, forbid such a conclusion. It appears to me to be one of those cases in which a strong predisposition to renal disease exists; that exposure, or any cause disturbing the equilibrium of health, to use an engineer's expression, throws the kidneys out of gear. Engorgement, followed by derangement of their excretory function, takes place; dropsical effusions come on; albumen appears in the urine; and an exudation takes place from the tubes of the kidney characteristic of the mildest form of disturbance to which they can be exposed. This exudative material in such cases as these, coupled with the mild and tractable constitutional symptoms, and the recurrence of which does not appear to be connected with any permanent disorganization would appear to justify our speaking of such cases as simple catarrh of the renal tubes. But, inasmuch as catarrh of the bronchial tubes recurring again and again, is either symptomatic of, or leads to permanent disease of the lungs—so, such attacks of the kidneys, mild and yielding as they may be at first, from repetition will lead, in all probability, to permanent disorganization of these organs.

### HYALINE CASTS, AND DEGENERATION OF CELL-STRUCTURE IN RELATION TO CHRONIC MORBUS BRIGHTII.

*Albuminuria—headache and rheumatic pains—œdema of the feet and ankles, and subsequently general dropsy—transparent casts in the urine, symptomatic of advancing renal degeneration.*

Case XVIII.—Thomas M—, æt. 40, a carman, admitted Jan. 23, 1855. This patient, on admission, presented the symptoms of syphilitic rheumatism, superadded to those of febrile disturbance and anasarca. He complained of severe gnawing pain in the head—referred to the parietal and frontal bones. There was some tenderness of the scalp, but neither nodal eminences nor thickening could be detected. There was pain also seated in the ulnar ridge of the forearm, as well as in the shin bones, aggravated at night. The periosteal surfaces of the tibiæ were sensitive to the touch, but were free from nodes.

The skin was hot, the tongue foul, and there was thirst and anorexia. He had a troublesome cough, with a profuse catarrhal expectoration.

The chest expanded well, and the resonance was not altered, but wheezing and moist mucous murmurs were heard in all the large bronchial tubes. The heart's sounds were natural. There was œdema of the feet and ankles, but no evidence of dropsy elsewhere. He stated that he had suffered for several winters from cough, expectoration, and occasional shortness of breath. His feet and ankles swelled about a month since. He had been troubled with a frequent desire to make water, particularly at night. He had never paid any attention to the appearance of his water, and did not know if it had ever been blood-coloured. He recollected that when his feet swelled he made very little water at a time. He had some medicine from the dispensary at that time, which purged him, and he got better. He suffered from syphilis severely a few years since. He was ordered purgatives, with diaphoretic saliness and warm baths. The urine was examined the day after admission. It was of a specific gravity 1·018. It contained a deposit of lithates, and was moderately albuminous; it was scanty in quantity, and contained many casts, some slightly granular, containing epithelium, some transparent, with a few scattered and isolated fat-granules. All the epithelial cells presented the appearance of a degenerative process, scarcely one that did not contain one or more fat-granules in its interior. A few compound fat-cells were visible. (Gluge's compound inflammation-corpuscles. Pl. IV, fig. 1.)

The febrile symptoms having abated, on the fourth day from admission, the chief symptoms were the rheumatic pains of the scalp, forearms, and shin bones; to these must be added increasing œdema of the lower extremities, extending up to the thighs, the scrotum was infiltrated also with dropsical fluid; there was increasing difficulty of breathing. The urine was scanty and more albuminous than on admission, and his condition presented all the most unfavorable indications of advancing disease of the kidneys. Spurious rheumatic indications are so common in the progress of Bright's disease, that had it not been for an unequivocal syphilitic history, and the location of the pains in the periosteal surfaces most usually affected in the secondary forms, we might have considered the rheumatic pains as subordinate to the renal disorder.

For a few days he was placed on sarsaparilla and the iodide of potassium, but the dropsical effusion continuing to increase, the face being slightly œdematous in the morning, and the swelling of the legs and scrotum not diminishing, these remedies were discontinued, and he was purged briskly with the cream of tartar and jalap, and ordered hot baths and antimonials. This treatment continued for four days, and having been well purged, the œdema disappeared from the scrotum, the ankles remaining slightly affected. Progressively with the diminution of the dropsical state of the lower extremities, the urine became more abundant, of light colour, lower specific gravity, 1·012, still albuminous, and contained the same form of casts which were observed soon after admission; these are represented in Pl. IV, fig. 2, and indicate, or rather confirm, the opinion first formed, that degeneration of the kidneys was slowly advancing. The state of the breathing was much improved, the cough not troublesome, and the sounds heard were limited to some moist mucous murmurs in the large tubes. The rheumatic pains had diminished, apparently through the agency of the warm baths and antimonials. He now took the tincture of the sesquichloride of iron, in ten-minim doses; occasional purgatives were administered. By the latter end of the month of February, the dropsy had disappeared from the thighs, scrotum, and indeed from the feet and ankles, except towards night, when a slight puffiness of the instep was present. The breathing was quite free, and there was neither cough nor expectoration. He was discharged on March 2nd.

At the time of this patient's discharge, he was cautioned about the probability of the dropsy returning, and I remarked at the time that I thought it would not be long before he would again require medical treatment. For, notwithstanding the subsidence of the dropsy, and the abatement of the rheumatic pains, and the absence of bronchial symptoms, the peculiar character of the deposits in the urine indicated to me unequivocally the progressive advance of renal degeneration. The continued presence of albumen in the urine, although in much diminished quantity, would certainly imply the existence of renal disease; but its gradual diminution, almost progressively with the subsidence of the dropsy, would be accepted as a fair and reasonable index of the probable recession of the disease. We have in this case, and at this stage of the disorder, abundant evidence, I think, to prove that any inference derived from calculations based on the amount of albumen daily excreted would be fallacious. The pale, watery urine, of a low specific gravity, is doubtless at all times an unfavorable symptom, but the disappearance of all the graver symptoms—the subsidence of the dropsy, the relief to the embarrassed breathing—would be accepted by most practitioners as favorable signs of improvement; and the state of the renal disease would be assumed to be either retrograding or stationary. But the character of the material passing off from the kidneys forbade any such conclusions; and the only satisfactory inference derived from the present condition of the patient was, that by proper management most of the graver symptoms of renal degeneration might be mitigated for a time, and though the degradation of the renal tissue could not be at this stage arrested, the complications which aggravated the sufferings of the patient might be relieved, and life perhaps prolonged.

The predictions which the microscope suggested, and which the microscopic revelations would alone justify, were in three weeks' time verified. On the 26th of March he was readmitted. He had returned to his employment as a carman. He stated that he continued to feel pretty well and able to go through a day's work, but that at night his feet and ankles swelled. He could not say that he had recently been exposed to cold or wet; but three days since he felt his breath again becoming short, and he suffered from troublesome cough. The swelling of his legs extended upwards, and on admission involved the scrotum, and even the loose areolar tissue of the prepuce. The aspect of the patient presented that doughy, pasty look oftentimes seen in this disease. The dropsy extended into the abdominal cavity, and there was distinct evidence of fluctuation in the abdomen. The urine had become high coloured and scanty—specific gravity 1·018, and it almost solidified by heat. The microscopic characters of the deposit are represented in Plate IV, fig. 3. The respirations were frequent, the breathing short, and difficult; frequent cough; moist mucous murmurs were heard all over the chest; pulse 90, full; no heat of skin or indication of febrile disturbances. He was ordered hot baths and the compound jalap powder, in drachm doses; but these, though they purged him freely, failed to lessen the dropsical effusion. The hot-air bath gave great relief to the thoracic symptoms aided by some antimonials and purgatives; for these bronchial conditions chiefly depend on dropsical effusion into the pulmonary parenchyma. As the anasarca continued to increase, half-grain doses of elaterium were given, and with cream of tartar succeeded, after taking three pills, in rapidly lessening the amount of effused fluid. The dropsy of the scrotum and prepuce subsided, the fluid in the abdominal cavity disappeared, and the œdema was limited once more to the feet and ankles. The breath-sounds became less embarrassed as the dropsy abated, and great relief was experienced by the patient of the more aggravated symptoms present on admission. The urine was increased in quantity—the proportion of albumen was again on the decrease; heat producing a milky coagulation, which when set at rest did not occupy more than one fourth of the tube, a fortnight previously it all but solidified by heat. The microscopic appearances had, however, in no respect altered; indeed the fat-cells increased in abundance, and the fatty degeneration of the epithelial cells was evidently on the increase.

On the 10th of April he was well enough to be up and about the ward. On the 14th, he left the hospital of his own accord, in consequence of some irregularities. I regretted very much to have lost sight of this case at this period of the disease. A month afterwards I learnt that he became rapidly worse on leaving the hospital. From a very imperfect description given me, I could only learn that the dropsy quickly returned, that he suffered much in his breath, and died at his lodgings, in Westminster. The kidneys were the only organs for which permission was given to be examined. They appeared somewhat increased in size, but I had no means of weighing them. The capsule was easily removed, and displayed the cortex coarsely granular—almost roe-like, mottled in colour—and a section showed some deep-coloured vascular marking perpendicular to the surface. The pyramids were striated also with vascular injection. The microscopic appearance of the roe-like granulations of the cortical part is represented at fig. 4. The Malpighian bodies are seen filled and distended with a fatty molecular exudation—the convoluted tubes much less so. The epithelial cells appear detached in parts. The straight tubes of the pyramids presented nothing remarkable. Although the microscopic character of the urinary sediment during life was not more significant of the coarsely granular than of the finely granular kidney, it nevertheless revealed the advanced stage at which the disease had arrived, and led to an unfavorable prognosis, even when the condition of the patient was otherwise promising.

This form of renal degeneration, moreover, does not advance uninterruptedly. The exudative process in chronic cases is apparently subject to intermissions, and at these intervals not only is there a subsidence of the dropsical symptoms, but the casts often disappear from the urine, although this excretion continues albuminous: moreover, the disease does not always progress with equal rapidity in both kidneys. One kidney is often seen in a more advanced state of degeneration than the other, and on this supposition we must rest the explanation of the reappearance of casts containing perhaps a few healthy epithelial cells, after an interval in which no casts could be found, and the dropsical symptoms had abated. The two intervals of such marked improvements could scarcely be anticipated from the appearance of the highly degenerated epithelium, and the hyaline tubes filled with free and aggregated fat cells. But in each of the examinations of the urine at these periods was seen granular casts containing epithelial cells free from fat, and exhibiting the characters of those thrown off in the earlier stage of the most favorable cases. I think these appearances afford evidence of portions of the renal structure being behind other parts in progressive decay. Probably through the instrumentality, either of one kidney not so far advanced in disease as the other, or through the agency of those portions of the kidney not yet arrived at the last stage of functional incompatibility, these favorable though short and temporary periods of improvement were obtained. I think moreover, and experience justifies the observation, that while among the poor, and those exposed to the hardships of exposure, and perhaps want, this form of disease progresses, in the majority of cases, with an unchecked rapidity, yet that in classes of life better cared for and less exposed, remedial measures can do much to retard the onward course of the disease; but their efficiency depends on the period of the disorder in which they are administered; for when once the renal degeneration has reached a certain stage, its arrest is hopeless.

Pain simulating the character of chronic rheumatism is so frequent a symptom in morbus Brightii, that it may be questioned whether the pain suffered in the earlier period by this patient was not rather of this character than of syphilitic origin.

## CHAPTER XIII.

### THE CURABILITY OF RENAL DROPSY.

The prognosis of renal dropsy is usually unfavorable. In the great majority of cases which come under observation in hospital practice, the subjects are either broken down in constitution from previous vitiated habits, or the disease has been allowed to make head till the patient gives in, no longer able to contend with the increasing obstruction to the functions of respiration and locomotion. Experience teaches those who have watched these disorders of the kidneys most closely, that, even in the most unpromising cases, timely care and appropriate remedial agencies in the early stage of the disorder might possibly avert the malady, and certainly will retard its progress and protract the fatal issue.

The following case strongly illustrates these remarks. The symptoms could not be more grave,—the prognosis at first, judging alone by the extent of the dropsy, would be necessarily unfavorable. But the patient came under treatment at the period most favorable for preventing ulterior organic change in the renal structures; and the microscope from the first, and through the whole period of treatment, became a valuable guide and a trustworthy index of the probable termination in complete recovery. It may be further remarked, that the age of the patient, and his freedom from habits of intemperance, were considerably in his favour.

Case XIX.—Charles R——, aged seventeen, engaged in stable work, was admitted on the 27th of July, 1859, into King

William ward. The aspect of the patient at once bespoke the probable source of his malady. The face was swollen and œdematous; the eyelids puffy; the whole surface of the body was pallid and anasarcous; the lower extremities up to the thighs deeply pitted on pressure, and the backs of the hands were swollen, and the forearms œdematous; the abdomen was slightly fluctuating on percussion; the scrotum and integuments of the penis were infiltrated with dropsical effusion; the breathing was not affected, but the breath sounds were defective in intensity, and at the base of the lungs there were moist, wheezing sounds during inspiration and expiration, such as are usually heard in œdema of the pulmonary tissue. There was evidence, then, of an anasarcous condition pervading all the tissues of the body. However, the heart's sounds were natural, and there was no evidence of pericardial fluid. The tongue was large and flabby, and covered with a dirty coat. The bowels were not constipated. There were thirst and anorexia. Micturition was frequent. *The urine was scanty in quantity;* it exhibited a dirty-red colour, from the admixture of a small quantity of blood; and it was *highly* albuminous. He stated that he had always enjoyed good health till about a month since, when he fell off in his appetite and in ability to work. He had some feverish attack; and he noticed not only that he passed urine more frequently than usual, but that it was very small in quantity, and of a deep-red colour. He had bathed a good deal in the Serpentine, and he attributed his present illness to having slept on the grass for several hours, after which he felt stiff and ill; and soon afterwards the symptoms of defective secretion from the kidneys became apparent, followed by puffiness of the eyelids on awaking in the morning, and the subsequent swelling of the ankles, legs, thighs, wrists, and forearms. He was ordered the compound jalap powder, in drachm doses, every morning, and to be dry-cupped on the loins.

The next day a careful microscopic examination of the urine was made, and drawings of the deposit, for future comparison with what might be observed hereafter, preserved. The urine, when set at rest, threw down a somewhat abundant deposit of a dirty-reddish colour. This, under the microscope, was found to consist of amorphous granular flakes of fibrine, in which blood-corpuscles were entangled. Numerous free blood-discs covered the field; and there were many large fibrinous casts or moulds of the straight tubes of the cones. No renal epithelium was visible; but there were several large compound granule-cells and aggregated clusters (*botryoidal groups*) of nuclei from disintegrated granule-cells—elements always present when a stage of active hyperæmia is present in mucous tissues. There was little change visible for several days; the dropsy did not diminish, although the powders acted each day vigorously. He had warm baths, and the dry cups were applied to the loins each alternate day. The pulse continuing full and hard, he was ordered the diaphoretic mixture, with the tincture of digitalis, in gradually increasing doses. The urine slowly became less coloured and clearer, and on the eighth day from admission the dropsy was reported to be on the decline, the face much less puffy, and the anasarca of the extremities decreased; the scrotum was not distended, and the indications of œdema in the lungs had disappeared. Nevertheless, the dropsical condition of the face was always apparent in the morning; decreasing throughout the day. The same treatment was continued, and in the third week (August 21st) he was reported as much improved. No change of any moment had taken place in the microscopic condition of the urine, for large fibrinous casts were still visible, one here and there containing an epithelial cell; the blood-discs were, however, much less numerous, and the quantity of albumen was notably decreasing. Micturition was not so frequent or troublesome, and the quantity voided each time was greater, the aggregate amount of the urine in the twenty-four hours being about the average.

A few days later the aspect of the patient had much improved; the dropsy of the surface was scarcely perceptible, except in the face in the morning; the pallor so characteristic of renal dropsy was, however, strongly marked. He was now ordered the tincture of the sesquichloride of iron with the acetate of ammonia and acetic acid in excess, and this he continued for several weeks. The appetite improved; and, the general condition of the patient permitting, he was made an out-patient. When he left, the dropsy had subsided altogether, but the urine was still albuminous, occupying about one sixth of the tube. He was strongly cautioned about the management of himself, and the necessity for continuing the preparation of iron. The sediment consisted of a few large granular casts, with here and there an epithelial cell; and a few scattered granular or exudation-corpuscles; and on the last day before I left town, there were seen a few casts becoming transparent or hyaline, containing a granule-cell or two within them.

I did not see the patient again till the 21st of October, and he had continued the sesquichloride and acetate up to this date. His appearance had much improved; his countenance had acquired the tint of health, and he was able to do a day's work without hindrance. The urine was again examined, and contained but a trace of albumen, becoming simply hazy by heat. He passed the ordinary average quantity, and micturition was not more frequent than natural. The last time this patient was seen was on the 1st of December, when his face appeared quite ruddy and his whole aspect that of a young man in vigorous health. The urine was, nevertheless, still hazy by heat. Examined by the microscope there was an unusual number of columnar crystals of uric acid. One delicate hyaline cast was seen, in the extremity of which a group of disintegrated nuclei were packed. In all other respects this secretion was perfectly healthy. If this young man does not fall into bad habits, or neglect his health, he will enjoy exemption from any unfavorable organic change in the renal structures, no evidence having appeared of any other condition of these organs than that of an inflammatory congestion, which, however, under less favorable circumstances, often rapidly passes into a fatal degeneration. There was less amount of epithelium carried away with the fibrinous and granular casts than usually happens, and there was no evidence of any extensive disintegration of cell-structure. The granular casts slowly becoming transparent without any but traces of clusters of nuclei, was also an indication that the disease was subsiding; such as occurs in inflammatory states of other mucous surfaces, simply mucoid elements gradually giving place to the ordinary secretions of the canals. The principles of treatment of this and similar cases consist—first, in reducing the watery state of the blood and tissues; secondly, the guarded restraint, within safe limits, of the hæmorrhagic disposition in the kidneys; and, thirdly, the improving subsequently, by a generous diet and chalybeates, the deteriorated condition of the blood which is so apparent in these disorders.

The selection of the remedies to fulfil these several indications is of more importance than may be at first apparent to the student. The reduction of the hydropic state of the blood and tissues can only be accomplished by purgatives; but it is not every purgative which will equally effect this object. The mercurial and resinous purgatives must be carefully avoided; one single dose of calomel may produce severe salivation. Those purgatives which act powerfully, as hydrogogues, must be selected. No remedy that I am acquainted with answers better or more effectively than the combination of jalap and cream of tartar, in the compound jalap powder of the London Pharmacopœia. This should be given in the morning fasting, in half-drachm or drachm doses in a wineglass of water. It may be repeated every or every other morning according to the effect produced. It possesses the great superiority over all other hydrogogue cathartics, that is not followed by any appreciable amount of prostration or exhaustion. In some constitutions it loses partially its effects by repetition, when more powerful remedies become necessary. To supply its place when this happens, the combination of gamboge, in the compound pill of that name answers very well. It is very apt to gripe and produce some sense of exhaustion. I rarely find it necessary to resort to it, as the first-named powder is sufficient in the great majority of cases. Elaterium sometimes may be necessary. The action of these hydrogogues drains away a large amount of fluid from the intestines, and at the same time saves the kidneys, which, in their state of inflammatory congestion, are unequal to the task of excreting the ordinary amount of urine, and are in a condition in which any increased labour thrown on them would aggravate their congested state. The use of warm baths, or the hot-air bath, and diaphoretics, will prove adjunctive to our efforts to save these organs from any increased excitation.

The urine to the unaided eye contained blood ; the microscope revealed that this blood came from the kidneys ; escaping from the Malpighian tufts of capillaries, it coagulated in the renal tubes, was eventually swept out by the current, and appeared in the urine as fibrinous moulds of the tubes entangling blood-discs. There was thus present an unequivocal hæmorrhagic state of these organs, and it now became a question of the greatest practical importance to decide on the propriety of endeavouring to restrain the escape of blood, or to allow it to proceed, within certain limits, without unnecessary interference—recognising it as a natural mode of relief to the overcharged vessels which, if imprudently or rashly obstructed, only precipitates the mischief which it is the physician's aim to avert. I am very decidedly of opinion that, in these renal disorders, hæmaturia bears to their progress the same relation which hæmoptysis does to some cases of tubercular deposit in the lungs—that is to say, that the disease is retarded by these natural methods of relief to the blood stasis of the parts. The use, therefore of astringents—such as the gallic acid, or salts of lead or alum—at the period of hæmaturia, is highly prejudicial. Even the taking of blood from the loins by cupping is an exceptionable practice, and only to be resorted to in exceptional cases. Dry cupping is far preferable. The only remedy having any direct influence on the hæmorrhagic state that should be employed is digitalis. The influence which this sedative exercises in many hæmorrhagic conditions is as remarkable as it is indisputable. It is not necessary here to discuss its *modus operandi* : it will be sufficient to say that daily experience convinces me that it is the most appropriate agent in the period of hæmaturia from renal engorgement. It may be given alone, or with some sudorific salines, such as the acetate of ammonia. It was continued in this case till the hæmorrhagic period had passed away. The microscope throughout this period, and even when it subsided, demonstrated that no evidence of ulterior organic change in the kidneys was present. The case therefore presented the most favorable indications for improvement, and the time had now arrived when the influence of chalybeates promised to be beneficial. Preparations of iron are of no use without the aid of a nutritious diet; so that when he was ordered the sesquichloride of iron his diet was advanced to the full allowance of the best kind. The sesquichloride was given in a form which appears to me to be peculiarly adapted for these renal cases; it is in combination with the acetate of ammonia and acetic acid; care being taken to add the sesquichloride to the previously acidulated acetate. It is remarkably efficacious, and is, moreover, not at all unpalatable—children taking it readily. It was not long before a manifest change for the better became apparent in the aspect of the patient; and by persevering in the plan laid down, at the end of four months his health appeared to be completely re-established, although the urine still contained traces of albumen.

The treatment of these cases requires patience and confidence on the part of the physician: patience, because, from the very nature of the disease, it must be often months before the patient can be pronounced convalescent; and confidence in the remedies, or rather the principles on which he employs the remedies, so that a steady perseverance in one plan may not be interfered with, and a variety of agents tried, merely because the patient does not appear to advance more rapidly to recovery. In this, as in other forms of chronic disease, the principle upon which the treatment is to be conducted being first determined on—and this resting, it is presumed, on a definite and correct diagnosis—will never be departed from; and the folly will thus be avoided of perpetually trying fresh remedies because those first selected do not appear to produce the effect desired, or to act so quickly as may be wished. It is thus that we may hope to combat these otherwise intractable disorders. A steady perseverance in the employment of ferruginous tonics (hæmatics), good diet, fresh air, moderate exercise, careful attention to clothing, and, as far as the station of life of the individual will permit, avoiding exposure to extremes of weather, particularly cold and wet; and susceptible as these organs are to derangement when once they have been the seat of disease, a patient suffering, as this young man was, from symptoms of the gravest character, placing life in jeopardy, may escape a recurrence of the disorder, if ordinary precautions for regulating the health be prudently taken and strictly observed.

### CONTRAST OF CURABLE, REMEDIABLE, AND INCURABLE CASES OF ALBUMINOUS AND RENAL DROPSY.

Clinical studies of renal disorders are never more advantageously pursued than when several cases of the same type or class of disease present themselves simultaneously for observation. Our clinical knowledge of any given disease is much increased by such opportunities of contrast and comparison; and if ever the vexed question of the "*oneness*" or otherwise of Bright's disease shall be settled, it will surely be promoted, if not decided, by grouping together and contrasting the symptoms and progress of many individual cases, recording the complications which may arise, and comparing all the antecedents with the morbid or organic changes which may be found in the kidneys after death. The microscope permits us to anticipate in some measure these post-mortem investigations, and to form an approximate estimate of the nature of the organic changes proceeding in the kidneys. This knowledge, even during life, of these pathological transformations is made most apparent, and its utility most clearly demonstrated when cases in different stages of renal disease are simultaneously under observation.

To the student in clinical medicine such opportunities are invaluable; the contrast at frequent intervals of the sedimentary products thrown off from the kidneys, of one case with the other, and a comparison of these microscopic appearances with the alteration of the symptoms, the diminution or increase of the dropsy, the decrease or otherwise of the albumen, or the increase of urine, is calculated to convey to an attentive observer a deeper impression of the value and importance of these microscopic appearances in the urine, than is ordinarily obtained by studying an isolated case of renal dropsy. It, moreover, familiarises the student with the aspect and character of those cases which are remediable, and enables him, with confidence, hereafter to rely on certain principles of treatment specially applicable to that form or state of disease which the microscope can alone reveal to him. Without the microscope it is impossible to distinguish between a case likely to improve under treatment, and one which may be viewed as hopeless. Without the microscope the treatment of these cases becomes at best but mere guess work. But, aided by the revelations of this instrument, the selection of remedies is regulated by clear and well defined principles; and it may be confidently asserted that, in a great proportion of the cases, the result becomes no longer conjectural or uncertain.

I will select the following three cases of albuminuria for illustration: The first, a youth of 18, may be considered a curable case; the second, a man of 46, a remediable case; the third, a labourer of the age of 32, with all the characteristics of the incurable form of the malady. I will first direct attention to the history and symptoms of each case, as well as to the microscopic character of the urinary sediment. I will then contrast these appearances with the progressive symptoms of the patients, and explain the reasons for the treatment which has been adopted in each case:—

Case XX.—Charles O—, a lad of 17 years of age, and well grown, was admitted in November, 1859, with manifest symptoms of acute renal dropsy. The face was swollen and œdematous, the eyelids puffy, the feet, ankles, and wrists, anasarcous. The abdomen was soft, and afforded no evidence of fluid. The heart sounds were natural, and the respiratory organs presented the signs of bronchial catarrh, as moist wheezing murmurs were heard in all the large tubes; there was also hoarseness and troublesome cough, with scanty expectoration of tenacious mucus. The pulse was frequent, 93 to 100. The skin of average temperature. The tongue was coated with a creamy fur, and there was thirst, with anorexia. The urine was scanty, dark-coloured, and highly albuminous. Micturition was frequent, particularly during the night. He had been ill about a fortnight, and attributed the commencement of it to getting saturated with wet for many hours, and going home tired and exhausted. He became feverish; suffered almost suppression of urine, it became so scanty, and was like porter or coffee in colour. The next day the face began to swell, and he was unable to resume his employment. He was ordered warm baths, the diaphoretic mixture, and the compound jalap powder. The urine was examined by the microscope, and found to throw down an abundant deposit, which consisted of coarse fibrinous casts, with a few blood-discs, and some granular corpuscles. The powder taken each morning acted freely without exhaustion, and the diaphoretic mixture reduced the slight feverish thirst he felt on admission. In about a week, under this treatment, the anasarca of the inferior extremities began to subside. The urine became more abundant, sp. gr. 1·018, highly albuminous, and still containing fibrinous casts without any trace of renal epithelium. The cough was less troublesome, and the appetite improved. On the seventh day from admission he began to complain of a sense of tightness and constriction across the abdomen, and there was some pain on pressure in the lumbar spaces. He was ordered four dry cups over the loins. On the eighth day he suffered an attack of hæmaturia. The urine, even to the unaided eye, containing blood. He was again dry cupped; but the administration of astringents, or any undue interference with this hæmorrhagic condition was carefully avoided. The general condition of the patient was not aggravated by the appearance of blood. The anasarca of the surface had certainly decreased. The pulse was softer, and about 80. The cough was still troublesome, but there was no fever, and a moderate diet was taken without disrelish. He was now ordered drachm doses of the infusion of digitalis, with carraway water; and in the course of a few days the urine became lighter coloured, but threw down an abundant deposit of coarse amorphous fibrinous flakes, and fibrinous casts of the large tubes entangling blood-discs, together with many free blood-corpuscles, and exudation corpuscles, all expressive of a state of active hyperæmia of the kidneys. The bowels continued to act freely, and the urine increased in quantity, and improved in appearance, under the combined influence of the cream of tartar and jalap purgation, and the digitalis.

The appetite improved, and the amount of albumen in the urine notably decreased. The pulse became 76, soft and natural. There was, however, still evidence of dropsical effusion about the feet and ankles, and the face in the morning was puffy. By the 26th, seventeen days from admission, these symptoms of dropsy disappeared, and the urine began to exhibit daily decreasing proportions of albumen. The sediment was composed of numerous exudation (mucous) corpuscles, fibrinous casts, with here and there a blood-disc and epithelial cell. Hitherto nothing but the hæmorrhagic state of the kidneys was portrayed by the microscope.

On the 2nd of December the report stated that every symptom of dropsy had disappeared. The urine was natural in quantity, slightly hazy by heat, and contained a mere trace of sediment, and there was every sign of approaching convalescence; when, after a bath, which had not been properly heated, he felt chilly, and became restless and uneasy all the following night. The tongue was furred; the skin was hot; the appetite gone, and there was thirst, with a quick feverish pulse. Signs of bronchial catarrh were again audible in the chest, and there was cough. The urine again assumed a red tint like currant-juice in colour. It was abundantly albuminous, and the microscope afforded evidence of the return of the hæmorrhagic condition as on admission. Care was taken that he had a hot bath in the ward; and followed by diaphoretic salines, and a repetition of the cream of tartar purgatives, the symptoms subsided in forty-eight hours. With this return of renal engorgement there was no return of any of the dropsical symptoms, and, although the urine contained evidence of blood for more than a week, yet no œdema of the face or ankles accompanied this relapse. The microscopic appearance of the sediment remained the same.

On the 12th of December he was ordered the sesquichloride of iron, and acetate of ammonia mixture, with an improved diet; but after a few days, as the amount of blood in the urine did not decrease, he was ordered five grain doses of gallic acid. But as this astringent failed to exercise any apparent effect on the escape of blood, he was once more ordered the infusion of digitalis. It was not till the 26th, three weeks after the relapse of his symptoms, that the urine assumed any change of character. It gradually lost the tint of blood, and as it returned to a more natural aspect, there continued a very plentiful sediment of a coarse brownish-colour, which consisted, as on admission, of large fibrinous flakes, large fibrinous casts with blood-discs and exudation corpuscles. Little or no renal epithelium was observed. The long continuance of this hæmorrhagic state told upon the aspect of the patient, and unmistakably implied the aid which might be derived, whenever safe, of chalybeates and increased nutrition.

Although the urine to the eye contained no blood, yet the large amount of this coarse sediment continuing, suggested the probability that the coagulated débris still present in the renal canals had yet to be washed out and escape, before we could expect the urine to assume all the characters of health. With the view of aiding to restore the blood-forming power, and aid in the washing away of this débris of the previous hæmorrhage, the chlorate of potash and the infusion of bark were given with great apparent advantage; for the stimulant effect of the chlorate on the kidneys seemed for a day or two to augment the coarse sediment which was deposited from the urine, and thus to remove or wash away the products of the previous hæmorrhagic period. In a few days the sediment disappeared, the amount of albumen daily grew less, and on the 15th of January, six days after taking the chlorate, the urine was, for the first time, reported as free from albumen. The chlorate was discontinued, and the sesquichloride of iron again ordered. On the 2nd of February this patient exhibited all the usual signs of complete convalescence. A steady appetite, with increase of flesh and weight, The urine in natural quantity, and micturition not frequent. For two or three days in succession this fluid was quite free from any trace of albumen; then for a day or two it may be slightly hazy; and this is the ordinary course in all similar cases. The urine for many weeks after exhibiting, at intervals, a haziness by heat. In all other respects the patient may be pronounced recovered and cured, and able to resume his ordinary employment, governed however by cautious admonitions to exercise the greatest care and prudence in avoiding all extremes of weather, and to provide for any contingencies to which he may be exposed, by attention to clothing the surface of the body. Such are the conditions and symptoms of curable cases of renal dropsy. Throughout the many weeks he was under treatment the microscope told of no disorganizing process other than that of hæmorrhage. No evidence of any change in the structure of the renal epithelium; no breaking down or disintegrating of these important cells; no evidence of any destructive process leading to the formation of epithelial casts; the few epithelial cells which were occasionally visible, were entangled in the fibrinous coagula passing from the renal tubes. The lad came to the hospital in February, 1862, suffering from an ordinary cold. He was in every other respect in good health, as a florid complexion and well-developed muscular system testified. Advantage was taken of the opportunity, and a sample of his urine carefully examined, it was found perfectly healthy. The case clearly exhibits morbus Brightii as curable under favorable circumstances.

The following case will, although we may consider it remediable, present many features as regards the urinary sediment different from the last.

Case XXI.—Fred. P—, æt. 46, a painter, was admitted December the 12th, 1859, suffering from general anasarca of the face, wrists, arms, thighs, legs, and ankles. There was obscure fluctuation of fluid in the abdomen. The respirations were hurried, and there was cough and scanty expectoration. The surface of the body had a waxy look, and the general appearance characteristic of renal dropsy. The urine was scanty, frequently passed; had a specific gravity of 1·022; was of a brownish colour, threw down an abundant sediment, and was albuminous by heat and nitric acid. He confessed to having lived freely—to have suffered an attack of painter's colic; but the gums did not present any appearance of the saturnine stain. He stated that he had suppression of urine at the time he had the colic. Lately he had been exposed to cold and wet, working in his wet clothes. A few days since he had suffered rigors, and the next day his face was swollen, and then the backs of his hands, and ankles, and feet. His water became very scanty, and from the tenderness across the loins, and the look of blood in the water, he thought he had an attack of inflammation of the kidneys, similar to what he states he suffered just previous to the attack of colic. The urinary sediments, in addition to the usual fibrinous blood-casts in hæmaturia, contained some granular casts containing epithelial cells; and there were many large compound granule-cells scattered over the field. He was ordered diaphoretics, warm baths, dry cupping on the loins, and the compound jalap powder. For several days the symptoms remained unchanged, except that the cough and respiratory symptoms abated. The urine, while it lost the ordinary appearance of the presence of blood, became more highly albuminous, and the dropsical effusions appeared to increase. The febrile symptoms of admission had, however, abated, and he was ordered the infusion of digitalis, with the bitartrate of potass. This was on the 22nd of December, ten days after admission. The bowels were daily relieved by brisk purgatives, with evident decrease of the dropsy of the surface of the body. The respiratory sounds became natural, and the breathing easy. The pulmonary œdema, of which in these cases there is always more or less present, abated before the dropsy of the surface. Under the influence of the digitalis, the urine rapidly increased in quantity. Its sp. gr. was, on the 20th, 1·016, and the proportion of albumen was decreasing. Many large compound granule-cells were seen in the sediment, but a patient search failed to detect any casts. The urine, when examined on the 24th, had shown the presence of one or two long fine hyaline casts, but no granular or epithelial casts could be found. On the 28th of December, still continuing the digitalis, the dropsy of the surface gradually decreased. The urine was sp. gr. 1·015, and the albuminous coagulate occupied about one-sixth of the tube.

He continued to make favorable progress to the 9th of January, when the bowels becoming constipated, the compound jalap powder failing in its purgative effect, the dropsy began to reappear about the wrists and legs; and it was not till after the compound gamboge pill with some saline purgative had been taken, that this temporary attack of constipation yielded, and a favorable report was again made.

On the 15th of January all trace of dropsy had disappeared, and the urine was only hazy by heat. He still continued the infusion of digitalis. The sediment on the 31st of January showed some transparent casts of small size, a few scattered blood-discs, many large compound granule-cells, and a few large coarsely granular casts, containing here and there an epithelial cell entangled in it. The report by Mr. Middleton on the 3rd of February stated, that he appeared in every respect convalescent. There was no œdema even of the ankles after being up all day. The general aspect of the patient was promising, and he spoke confidently and gratefully of his recovery. His appetite was good, and his feeling of physical vigour was better than he had known for some time. Nevertheless, with all these promising conditions, we should not shut our eyes to the facts which the microscope reveals. Although the urine contained but little albumen, and the sediment amounted to scarcely more to the unaided eye, than the mucous cloud seen in all healthy urines, yet the cloud contained large casts, with here and there an epithelial cell, but those epithelial cells were not unhealthy in appearance; there was no appearance of a breaking down, or a rapid disintegration of them, yet experience tells us that under the least unfavorable circumstances this process would rapidly arise, and the patient become plunged into the fatal disorganization of granular and fatty degeneration.

It is, therefore, on this account that I call the case remediable rather than curable. To all outward appearance the case was cured; the dropsy was gone, all the ordinary functions were performed equably, nutrition went on favorably, and the urine appeared healthy, containing but a trace of albumen. It may be hoped that the result will be more favorable than I anticipate. He took the sesquichloride of iron, with the object of still further improving the quality of the blood, and thus promoting the disposition to the formation of healthy cell-structure; and by this means averting any tendency to the development of a chronic degeneration and decay of the cells of the kidney. The proof of the permanent recovery of this patient was satisfactorily established in the early part of 1865. In February of this year, F. P— applied for admission into my ward suffering from rheumatic pains, accompanied by some tenderness and swelling of the bursæ of the right knee-joint. He stated that for the last five years his health had been good. His urine was carefully examined, and presented all the characters of health. Local treatment quickly relieved the pain, and in ten days he left the hospital quite well, affording another satisfactory example of the curable character of this once believed incurable disease.

The next case, I fear, must be classified as incurable, and offering but a limited prospect of any permanent benefit to be derived from treatment.

Case XXII.—Stephen H—, æt. 32, a bricklayer, was admitted into the hospital December 13th, 1859, suffering from symptoms of general dropsy. The whole surface of the body was anasarcous, and the face of that pasty look so characteristic of renal dropsy. The abdominal cavity contained fluid, and the lungs exhibited the signs of œdema pulmonum. There was headache, and some occasional dimness of vision. Micturition was frequent and troublesome. The urine was abundant, very clear, of a pale straw colour, and highly albuminous. The sp. gr. on admission was 1·015. His health had gradually been failing for the last six months. Last March he had an attack, commencing, as he stated, with swelling of the face, and subsequently of the legs and ankles. He does not recollect that he ever passed blood, or that the quantity of water was less than usual. He states, that after the illness in March, he made a great deal of water, and got better; and since that time he has slowly got worse. His face began to swell some three weeks before admission. The urine, when set at rest, was perfectly clear and bright, except a very faint flocculent cloud, which, on being examined by the microscope, exhibited a number of large granule-cells, and a few hyaline casts with numerous resplendent, but isolated molecules highly refractive, which were the nuclei of disintegrated cells. One of the casts contained an epithelial cell natural in appearance. The dropsical state of the surface slowly gave way to the effect of purgatives; and a week after admission, the urine continuing highly albuminous, he was placed on five grain doses of gallic acid, with the hope and object of controlling by its astringent effects the large drain of albumen through the kidneys. For it must be apparent that this loss of one of the most prominent of the proximate principles of the blood, must impoverish that fluid, cause it to become more watery, and thus maintain that state which it is the aim of purgatives to remove. The more watery the blood the lower is the specific gravity of the liquor sanguinis. Whatever lessens the specific gravity of this fluid in which the blood-corpuscles float and circulate, favours their destruction by the exosmosis which is established between the contents of the cell and the fluid in which it moves. The cell-wall bursts, and the red-corpuscles decrease in the blood, hence the peculiar spanæmia of albuminuria.

If gallic acid then can restrain the escape of albumen through the urine, one object in the treatment is attained. It is not so clear that it can do this, nevertheless, *some apparent* decrease in the amount of albumen passing out by the urine has been observed in certain cases, and this supposed effect of the remedy justified a trial. The urine, which had been abundant before, and of low sp. gr., 1·010—1·015, now decreased daily in amount, and the specific gravity rose as high as 1·020 on the 26th December, and 1·018 on the 28th. It is to be regretted that the amount of albumen daily excreted was not accurately determined by weight. The decrease was only approximately estimated. The daily amount of urine became reduced to one-half of what it was before taking the gallic acid, and the amount of albumen in each sample of urine examined did not occupy one quarter of the tube. The daily amount of albumen excreted with the urine had evidently then been considerably reduced. The dropsical condition was confined to the lower extremities and the face in the morning. The appetite was good, and the abdominal functions worked favorably. In the first week of January, 1860, his condition was reported as not so favorable, the dropsy of the surface increased, and the face assumed a waxy look. The gallic acid was discontinued, and he was ordered the phosphate of iron in four grain doses, with a liberal diet of animal food, and a pint of porter, daily. The urine became again more abundant, and of lower specific gravity, 1·014, 1·012, and 1·010, in as many successive days. It continued, however, less albuminous than during the earlier part of the treatment. For several days the anasarca of the surface continued to increase. There was no return of headache, or thirst, or symptoms of feverishness. The urinary sediments exhibited beautiful transparent hyaline casts, studded with aggregated clusters of nuclei, a few epithelial cells undergoing transformation, and containing fat-molecules, were visible. The improved diet, with the chalybeate, after a time produced a beneficial result; for, on the 1st of February, the anasarca of the surface was again stated to be decreasing, and the aspect of the patient somewhat improved. The urine remained clear, of a sp. gr. 1·012, moderately albuminous, the coagulate filling less than a quarter of the tube after being allowed to subside. How long this negative condition would continue it was impossible to say; while under the influence of a good diet, a uniform temperature, adequate clothing by day as well as by night, the disease will progress but slowly, and the sanguine might think to stand still; but so soon as, from the circumstances of his position, he leaves the hospital and becomes exposed to the pinching necessities of a poor diet, and the scanty aid of a parish allowance, the disease will resume its progress, and rapidly, I fear, hasten to an unfavorable termination. I have thus brought forward, for the sake of comparison, three cases of renal dropsy of different degrees of intensity, and varying somewhat in form. The first has not passed beyond the stage of active hyperæmia, and no organic change has been apparent in the cell-structure of the kidney. Casts of coagulated fibrine moulded in the renal tubes, entangling blood-discs, and here and there an epithelial cell have been evidence of the hæmorrhagic state of the kidneys. It is characteristic of this period of the disorder, that after the subsidence of the hæmorrhage, and when the urine is gradually assuming the qualities of returning health, that there exists so great a disposition to the return of hæmaturia and renal congestion, that the least disturbance to the equilibrium of the circulation, throws the kidneys quickly into a state of congestion, only to be relieved by the escape of blood through the Malpighian capillaries. After a most favorable progress, and when convalescence seemed approaching, an accidental chill immediately brought back the appearance of blood in the urine. And it is ever thus in these cases; and the knowledge of this fact should cause the physician to redouble his efforts, to instil caution and care into the management of such patients, weeks, even months, after the disappearance of the hæmaturia.

The second case presents also the state of congestion and renal engorgement, as the starting point of some of the forms of renal degeneration. The history of a previous attack is not very reliable. He suffered from painter's colic, but whether he had hæmaturia is difficult of proof, there is a probability, nothing more. We have more particularly to deal with the case while under our observation. Scanty urine, hæmaturia and general anasarca, following exposure to cold and wet, is a history common to most of these cases. The hæmaturia in this case was neither so profuse, nor did it last so long as in the younger patient. After the first few days from admission, the evidence of blood to the unaided eye was lost; and it was only the microscope revealing blood-corpuscles and few fibrinous coagula, which contained also blood-corpuscles. But this soon gave place to the presence of granular casts containing epithelium.

There were also numerous large compound granule-cells. These are ever present in inflammatory states of mucous surfaces, and are probably cells modified in their development by the altered nutritive process during the presence of the inflammatory stasis. The granular casts, containing epithelial cells, were very few, and sometimes could not be found, several days often passing without any being detected. This demonstrated that the disorganising process was not very active, and might hold out hopes of being arrested. In unfavorable cases of this type, these granular or epithelial casts are abundant and numerous, and imply a rapid and extensive process of disintegration and destruction of the renal epithelial cell. It is to this symptom, to which Dr. George Johnson has applied the term desquamative nephritis. It is certain that an extensive destruction of cell-structure goes forward, oftentimes beyond the power of subsequent reproduction. The object then of the physician is, if possible, to modify and limit this destructive agency. The hæmaturia having subsided, the first thing to be attained is the reduction of the dropsy; having gained that point, no time is lost in building up and endeavouring to repair the waste which has taken place. A liberal diet, ferruginous preparations, great attention to the functions of the skin, are the chief features of the treatment; and if a rigid attention to the maintenance of the digestive functions at the highest state of efficiency, be diligently observed, a fair period of health may be obtained, and life considerably prolonged. The urine continues albuminous, but only faintly so; and it is oftentimes with difficulty that any characteristic forms can be detected in the urine. This represents the quiescent stage, which in the lower class of life, from the necessities of their position, is seldom prolonged to any great interval. The dropsical symptoms return, the albumen of the urine becomes more voluminous, and the sediment now contains transparent casts, waxy, as they are sometimes called, loaded more or less with resplendent granules, or aggregated masses of nuclei. The third case under consideration presents all these last unfavorable conditions. He had apparently, from his history, passed through the first stage nearly a twelvemonth since.

Whether he had hæmaturia cannot be determined. He had all the symptoms, by his account, of acute renal dropsy; there was an interval of a few months of comparative health, and again the dropsy appears. The urine was plentiful, pale, of a low specific gravity, and highly albuminous. The casts were hyaline, transparent and loaded with resplendent granules. Judging from this evidence, this patient had advancing granular disease. The kidneys were probably not larger than usual, perhaps less, and belong to that form of morbus Brightii, in which the cortical part is scabrous or granular, or even nodulated. To advance speculative doctrines in clinical teaching is to lose sight of the essence of teaching by example at the bed side, and I forbear making any but the faintest allusion to the question, as to whether the probable state of this patient's kidneys are subsidiary to the large, pale, flabby kidney of the acute form of morbus Brightii. Patient observations can alone solve this question. There is evidence that this patient nearly twelve months since suffered an attack of acute dropsy. A comparison of the sedimentary deposits in the urine at that time, and at the present period of the disease, would assist much in solving this interesting question; and I have alluded to it for the purpose of recognising the importance of keeping records of these appearances for the sake of future comparison, with the certainty that it is only by such careful patient observation that these interesting pathological laws can be finally determined.

The subsequent records of two of these cases have clearly established the fact of the complete and perfect curability of this form of renal disease. They exhibit, moreover, the value of the evidence on which in one case at least a favorable prognosis was pronounced, and cautious as I was in deciding on the prospect of the other, I yet ventured to express a hope that the future result and state of the patient might be more favorable than I then anticipated. By reference to the sequel of Case XXI, p. 184, it will be seen that complete recovery was effected, as six years afterwards he was free from every trace of the disorder.

# CHAPTER XIV.

## ON THE TREATMENT OF MORBUS BRIGHTII.

### INFLUENCE OF REMEDIES, PARTICULARLY FERRUGINOUS, ON THE PROGRESS OF MORBUS BRIGHTII.

A FEW years since, and morbus Brightii was considered an incurable disease. More recently this opinion has become modified; and experience leads to the opinion, that while some cases are incurable, and run their course rapidly and accompanied by a tumultous disturbance of the chief organs and functions, there are nevertheless many cases amenable to treatment, and capable of being brought into the category of a remediable if not curable class of disease. These more favorable results I am inclined to attribute to more expansive views of the pathology of this disease, and consequently to more steady adhesion to defined principles of treatment. While attention was chiefly directed to the local conditions of the kidney, while the disordered state of the organism and the albuminuria were both referred to the anatomical changes and impaired functions of these organs, the treatment was chiefly directed to the secretion of urine, with the hope of lessening the drain of albumen, by the diminution of which it was hoped to check the progress of renal disorganisation. But for some years past I have taught, and I have but echoed the opinions of many contemporary physicians, that we must look to the kidneys rather as the organs which more plainly reveal to us the nature and peculiarity of the constitutional disorder, than as the *fons et origo mali.*

The renal degeneration is but the manifestation of a wide-spread constitutional disorder, plainly indicated during life by the very distinct morbid character imparted to the urine, but by no means limiting itself to the organs which excrete this fluid, but on the contrary, pervading every tissue, and interfering with the nutrition and functions of every organ, and leaving in them unmistakable traces of the all-pervading decay which prevailed throughout the organism. In studying, then, the pathology of the various forms of morbus Brightii, we must look beyond the albuminuria; we accept that as but the indication, and we endeavour to reach, if possible, the cause of this disposition to deranged secretion, and subsequent disorganisation of the kidneys. It is impossible to view the wide-spread alteration in the cell-structure of all the tissues without immediately supposing that the blood must be viewed as the primary source of the disturbance. That which conveys nutrition, supplies the pabulum for secretion and excretion, and brings the vital forces into activity, must be defective and impaired before the process of decay can be established, or those organic changes in the nutrition of the tissues can take place, by which not only the equilibrium of health is destroyed, and dropsical accumulation takes place, but eventually the life of the individual sacrified.

Whether it will ever be capable of proof that the impairment of the blood is the primary cause of morbus Brightii need not be argued: this much is certain, that the physiological chemist has shown by numerous analyses the altered composition of this fluid in cases of albuminuria, the chief of which consists in the diminution of the blood-corpuscles, and the increase of water.

These are the most important, and for practical purposes, are those only which need our attention. I believe that these facts and this kind of reasoning have exercised a most salutary effect on the course of treatment now pursued in cases of albuminuria.

It is unnecessary for my present purpose to raise the question whether this state of the blood is brought about by the drain of albumen, and consequently is but an effect of some remoter cause, or whether the vital properties of the blood becoming defective, assume the lead in the train of morbid results; for such is the correlation of the blood to the organs of nutrition, and of the latter to the blood, that it would be folly to attempt to assign the limits of either. It is, however, necessary for the object I have in view, to accept as a well ascertained fact that the blood in morbus Brightii is hydræmic, or watery, and that the blood-corpuscles are deficient. These are the fundamental conditions on which a rational treatment of the disease should be conducted. It may be accepted as a pathological axiom, that the more watery the blood, the greater is the drain of albumen.

It is, then, a natural inference that an alteration in the quality of the blood must be effected before the albuminuria can be decreased; and it is, therefore, by the employment of remedies which will bring about this object, that the treatment of these cases should be conducted.

In the acute form of morbus Brightii there is, in the earliest stage, a period of febrile disturbance which requires management before the patient is placed on those remedies, the action of which shall reduce the watery state of the blood: but so soon as this period has passed, the employment of purgatives which are capable of inducing copious watery dejections become necessary. The most powerful are elaterium, or gamboge, or jalap and cream of tartar. At first little or no impression appears to be made on the dropsical effusions; but after a time varying very much in different cases, a marked decrease in the anasarca of the surface, and an improvement in the breathing gives notice of the subsidence of the serous infiltration.

During the action of these hydrogogue medicines the patient must be kept up by a liberal diet and moderate amount of stimuli; and from the capability of taking nourishment, a more favorable opinion may be entertained, however serious the symptoms may have been. Whenever the diminution of the accumulated fluids becomes apparent, even though it be but temporary, measures must be taken to promote, if possible, the formation of a richer blood. It is notorious that the several preparations of iron in conjunction with wholesome food will augment the proportion of blood-corpuscles in a more rapid manner than food, however nutritious, will effect unassisted. These preparations of iron usually called hæmatics, are however not equally efficient. In these cases of renal dropsy no preparation answers so well as the tincture of the sesquichloride. Small doses are better than large, and five or ten minims three times a day will answer all the purposes designed in its administration.

As the amount of deterioration and diminution of the blood-corpuscles differs in different individuals suffering from this form of renal dropsy, so will the effect of the chalybeate differ; and it appears to me, deduced from many hundred cases, that the less the deterioration of the blood, the more quickly apparent will be the effect of the iron; and the greater the deterioration, the longer before an obvious effect is produced.

This remark may almost appear unnecessary, as it might readily be inferred that the greater the loss, the longer time would be necessary to restore that loss; but the observation is made that disappointment in the progress of a case may not needlessly be felt, and that encouragement may be given for persevering in one course of treatment—not disheartened because the results we wish are not immediately apparent.

And now, as the blood becomes less watery, and the nutritive functions are forming a better blood-supply, a slow but gradual diminution in the amount of albumen in the urine will follow. The microscope will prove that the disorganizing process in the kidney has been arrested, and that the casts are becoming less granular, more hyaline, and more allied to the products of a simple catarrh of the renal tubes. Whenever such results follow the treatment, the patient has a fair prospect of recovery. I will venture to ask, can any principle of treatment be more rational, or more in accordance with common sense, than that no beneficial change or alteration in the excretion of the kidneys can be expected till the blood has acquired a more healthy composition, and the proportion of blood-corpuscles have been restored to the physiological standard?

With this restoration cells will cease to decay, the tissues will return to their natural functions, and the products of secretion and excretion will once more afford the characteristics of health.

Chemical analysis has been appealed to to determine the qualities of the blood in the acme of this disease, and chemical analysis may be again appealed to to certify the state of the blood as convalescence proceeds. Some years since, to determine this point, I estimated the blood-corpuscles during the acute stage as low as 105 in 1000 parts of blood, and during the convalescence of the same individual, the proportions rose to 125 and 130.

I think these facts inevitably lead to the conclusion that the treatment of morbus Brightii, to be effective, should be addressed rather to the general nutrition of the blood than to the local condition of the kidneys, or of any other organ, only so far as that organ may be the seat of local congestion or delay of blood in it. I think that, guided by these views, we may recognise the cause of the failure of those methods of treatment which have been based on the idea of a local kidney disorder, rather than on a diffused constitutional disturbance; and I would also venture to assert that this was the reason why, up to a recent period, morbus Brightii was considered as an incurable disorder. That it is a very serious and a very fatal one, daily experience testifies; but experience also justifies the assertion that many cases are remediable, and, with proper care on the part of the patient, curable. I am confident that these more satisfactory results are to be traced to a course of treatment very different from that adopted in the earlier records of this disease, and based upon views already announced; estimating the renal disturbance and the albuminuria but as the manifestations of a wide-spread constitutional disorder; views which have suggested that aid should be chiefly directed to improve the functions of nutrition, and the progress of degeneration in the tissues, if possible, thereby arrested.

The following case discharged convalescent will forcibly illustrate my present position. I cannot forget the formidable character of the symptoms on his admission, nor the unfavorable view I at first entertained of his recovery, and that through the entire period of ten months, the treatment was conducted on one uniform principle. There was no flying from one remedy to another; there was a strict adherence to the doctrine I have inculcated, and I think a summary of the case will be a good practical illustration of the advantages of this method of treatment.

The case exhibited many features of interest, passing as it did through the acute stage of morbus Brightii to a more chronic form, and ultimately to recovery; a recovery so complete that he subsequently presented himself at the hospital, having been a month in that excellent institution, the Convalescent Hospital, at Walton-on-Thames, and had walked up to London, a distance of eighteen miles.

Case XXIII.—T— W—, æt. 46, a brickmaker, was admitted June 28th, 1860, suffering from diffuse general dropsy. The whole surface of the body was anasarcous, the face was swollen and puffy, and exhibited that sodden pasty look so characteristic of renal dropsy. Both upper and lower extremities were greatly œdematous; the scrotum was pellucid with infiltrated fluid; the breath was short and wheezy from pulmonary œdema. There was headache, a furred tongue, loss of appetite, and thirst and feverishness. The pulse was 90, of moderate power. Short and distressing cough, and occasional attacks of dyspnœa. The urine was scanty, sp. gr. 1·020, dirty coloured, from admixture of blood-corpuscles, and contained a large proportion of albumen. Micturition was frequent and distressing. The urinary sediment exhibited, under the microscope, isolated blood-corpuscles, granular casts, compound granule-cells, the usual products of the congestive or acute stage of renal dropsy. A few days prior to admission, after exposure to wet, he appears to have had pains in his limbs and rigors, these were accompanied by scanty urine, frequency of micturition, and a rapid swelling of the whole surface of the body. Here was a state of febrile disturbance with the infiltration, and accumulation of fluid into all the tissues of the body; the kidneys in a high state of congestion; blood becoming extravasated in the Malpighian corpuscles, and mixing with the scanty urine, revealed the condition of these organs, their functions all but suspended and incapable of activity. Every function of the body was deranged; there was headache of that peculiar kind usual in these cases; a constant, unceasing frontal and sincipital ache; he complained of it for several weeks, and I believe it arose from the retention in the blood of nitrogenized matter, which should be excreted by the kidneys.

The respiratory functions were impeded; a wheezing bronchial murmur was heard everywhere; dyspnœa came on in paroxysms; the entire mucous surface of the nutritive organs was deranged, and in an unhealthy condition. There was no appetite; great thirst; great restlessness; with defective action of the skin. The bowels were less disordered, less constipated, than sometimes happens.

It was obvious that this general febrile state must be allayed before any relief could be expected to the dropsy, or to the congested state of the kidneys.

Warm baths, gentle diaphoretics, moderate purgation, and nutritious broths, were the means by which, in the space of a few days, these feverish symptoms were allayed. Advantage was taken of this first favorable opportunity, and he was placed on a meat diet. For several days he suffered from irritation of the urinary organs—a very common symptom—and characterised by pain at the neck of the bladder, and at the extremity of the penis, with very troublesome frequency of micturition. I should, at this period, have employed brisk purgatives, but the bowels acted spontaneously and freely, five or six times daily, producing abundant watery motions; Nature herself, as it were, pointing out what ought to be done, where such free action is not present. We should, therefore, on no account, restrain this salutary drain. The headache continued; the character of the urine, and the amount of albumen, remained unchanged, and the anasarca apparently increased.

The microscopic appearances in the urine had undergone some trifling change. There were no blood-discs, and the casts were simply granular, with here and there an epithelial cell and compound granule-cell. On the 9th of July, as the dropsical state seemed almost to increase, and the urine continuing very scanty, and the microscope affording evidence that the active period of congestion had subsided, he began to take the infusion of digitalis and cream of tartar, but the sedative effect on the pulse required this to be discontinued on the third day. He was then directed to take the liquor ammoniæ acetatis and sweet spirits of nitre, and the amount of urine soon increased. But with this increased activity of the kidneys came a sluggish condition of the bowels, and the dropsical fluid began seriously to accumulate. The areolar tissue of the penis and scrotum was distended to the utmost stretch of tension; the cuticle of the lower limbs became reddened and watery. The respiration was wheezy and difficult, and it became necessary to seek relief by the employment of hydrogogue purgatives. The compound jalap powder becoming inert in a few days, elaterium was given in a form very useful, when small but repeated doses may be necessary. Two grains were dissolved in sulphuric ether, and the eighth of a grain was given every six hours till the desired effect was produced. Very abundant watery purgation was obtained, and a very sensible impression made on the parts distended by the dropsical fluid. By the first week in August he was making, apparently, very favorable progress, the amount of urine increasing, becoming less albuminous, the sediment, however, presenting no change from the last examination; the appetite continued good; the bowels now and then required the aid of a brisk cathartic, when, without any visible exciting cause the urine became suddenly charged with blood, decreased rapidly in quantity, and with this unfavorable change the anasarca again returned. He was dry cupped over the loins, and took the infusion of digitalis. The pulse fell to 60, but as he was closely watched by Mr. Middleton, the house physician, the remedy was continued, and the pulse remained at this rate without any intermission for the period he was under this valuable sedative. Although the urine increased, and the signs of hæmaturia quickly disappeared, the anasarca returned in as great a degree as before. The digitalis was again withdrawn, and the elaterium administered. Again copious watery discharges were obtained, again the dropsical fluids were drained away, and once more the disease seemed to be passing into a chronic stage. During the whole of August he was able to take nutriment freely, and he was allowed six ounces of gin daily. With varying results this course was pursued through September and October. The dropsy, ebbing and flowing principally in obedience to the active agency of powerful cathartics. During these months he had taken the elaterium only occasionally, when the dropsy seemed threatening to return; but he had with great regularity taken the sesquichloride of iron in the form I invariably administer in these cases, believing that it ministers to the reparation of the blood, co-operating with nutritious diet, in a more marked and satisfactory manner than any other form of iron. On the 11th of October drawings were made of the urinary sediment. Casts of small size, some hyaline, some granular and fatty, with some large compound granule-cells, a few disintegrating and breaking-up were shown by the microscope. Consistent with experience it was not possible to view these microscopic conditions without apprehension, or without prognosticating that the apparently intractable disease was passing from the acute into the more protracted, though scarcely less fatal stage of morbus Brightii. The approach of winter brought with it an aggravation of his symptoms. Notwithstanding the uniformity of temperature kept up in the wards, it is impossible for patients to escape the influence of the seasons. Serious symptoms of pulmonary disturbance, severe bronchial catarrh, constant harassing cough, attacks of dyspnœa, aggravated by the œdematous state of the pulmonary tissue, were superadded to the dropsical state of the lower limbs, the scanty and albuminous urine, and the languor and heaviness of an almost bedridden helplessness. Such groups of symptoms justified an unfavorable prognosis; but the resources of medicine were not abandoned. Sulphuric ether and ammonia gradually relieved the bronchial disturbance; various active purgatives were occasionally administered, and the dropsy by these means kept from accumulating. But the chalybeate, with nutritious diet, and a moderate allowance of stimuli, were sedulously continued, and not for one day neglected.

At the end of the year, after six months' treatment, the only favorable symptoms which could be recorded was that the digestive organs continued able to appropriate nutrition, and that a liberal diet maintained a certain degree of energy and power. Insignificant to some as this isolated symptom might be, it was the fundamental condition on which future recovery must depend; so that, notwithstanding the varying amount of dropsy, sometimes infiltrating the lungs almost to the limit of fatal impediment to the respiratory process, and then decreasing with a rapidity which ushered in expectations of permanent subsidence, which in a day or two were exchanged for the return of the anasarca; this one symptom, the power to build up through the agency of nutrition the failing and decaying structures, was the sole representative of encouragement, and prompted the more favorable prognosis which at the beginning of the year I ventured to express. The treatment remained the same. Ether and ammonia relieved the dyspnœa, purgatives controlled the dropsy, and chalybeates and good diet seemed to favour a reparative process in the renal organs; for the casts contained no longer evidence of broken down and decayed cell-structure. Now and then an epithelial cell was visible, presenting the appearance of a return to the ordinary type. The casts were mostly hyaline and small in diameter, and might be appropriately accepted as a kind of catarrhal exudation from the renal tubes, rather than as an index of any process of disorganisation.

By the second week in January the dropsy began steadily to subside. Paroxysms of dyspnœa, however, would frequently occur at night time; but, nevertheless, the progress of the patient continued throughout the month to be satisfactory. The urine daily assumed a better character, increased in quantity, contained a marked decrease of albumen, the sediment was less abundant, and the microscopic appearances justified the hope that the improvement would be permanent.

The month of February witnessed a similar progress, the dropsy was now limited to a slight œdema of the ankles; the patient was able daily to be up several hours, although attacks of dyspnœa during the night suggested the necessity for caution. The specific gravity of the urine was on the average of days 1·016, and for a day or two would remain free from albumen, and then for a few days a trace would become visible, but without any other microscopic object than a few small hyaline casts, and a few so-called mucous corpuscles. From this period to the date of his discharge in the middle of March, there occurred nothing worthy of special note. He walked out daily when the weather was fine, his appearance improved, the pasty sodden look gave way to a better complexion. There was no other sign of his late disorder than a slight swelling of the ankles after walking much. The respiratory sounds were healthy, with only an occasional wheezy murmur in the large tubes. The heart sounds were feeble, but without any murmurs.

The digestive organs continued in healthy activity; the bowels acted without assistance; the urine contained but a trace of albumen, and that not always; he passed his water naturally, and not more than twice in the night. He subsequently passed a month at the Convalescent Hospital, at Walton-on-Thames, and returned with evidence of the benefit which that excellent institution affords to the patients of our Metropolitan hospitals during the critical period of their convalescence. I think this case very forcibly illustrates the doctrine already enunciated, that morbus Brightii belongs to a class of disorders, the typical character of which consists in a more or less rapid decay or degradation, or breaking down of the cell-structure, not only of the kidneys, but of the organism generally. A degeneration more clearly demonstrated as existing in the cell-structure of the kidneys, but by no means limited to those organs: a degeneration which can only be effectually checked by imparting through the agency of a liberal diet and stimuli, restorative powers to the blood, and trusting through this channel to arrest the disposition to defective nutrition in the tissues. If we read these cases correctly we shall witness from the commencement manifest indications of the want of vital force or energy; if we lower that defective or impoverished vital force by remedies which still further exhaust or depress it, we add to the fatality of a disease already in its very nature disposed to be fatal. But on the other hand, if the principles of treatment here inculcated be judiciously and steadily carried out, if we cautiously abstain from remedies which depress and prostrate the vital energies; if the temporary exhaustion, which now and then will follow the employment of active cathartics, be carefully guarded against by the use of appropriate stimuli; if the diet be well regulated and nutritious; if the digestive organs be carefully attended, that their powers may be maintained,—then many a patient will be reclaimed from a position of danger to one of safety, and the opinion will rapidly gain ground that this disease, formidable though it be, may, when its nature is understood, be made amenable to treatment; and the fatality of an earlier period of the history of the disease be exchanged for results, which will be traced to a more philosophic conception of the pathology of morbus Brightii, and one more strictly in accordance with the opinions of the distinguished physician whose name it bears.

The sequel of this case strongly confirms these observations, and proves how manageable even the most unpromising cases of morbus Brightii become under the influence of treatment guided by the principles here enunciated.

In the spring of 1864, this man came to me for advice for some dyspeptic symptoms, which appeared to arise from hepatic disorder, traceable greatly to his fondness for gin and beer. He was otherwise in good health. His urine was clear, bright and natural, and its examination proved it to be a healthy excretion. Here, therefore, was evidence that the terrible malady of four years antecedent had left no trace on the kidneys.

In September, 1865, he presented himself again, under far less favorable circumstances. In the early part of the year he was hearty and strong, and able in the spring at the usual period to resume his work as a brickmaker. He continued this employment throughout the summer, consuming, he says, as usual a large amount of beer and gin. In some unsettled weather in August he got wet, and had a rigor and some feverish symptoms; and in the beginning of September he was again admitted into King William Ward. His legs were slightly anasarcous. His urine scanty and albuminous. The sediment exhibited some granular casts with some large compound granule-cells—a few isolated blood-corpuscles, and some mucous corpuscles. He stated that some days prior to admission his water became as dark as porter, very scanty, and he thought it contained blood. He complained chiefly of loss of appetite, failing strength, and a painful sense of constriction across the belly. A few days after admission the stomach became so irritable that vomiting occurred after every species of ingesta, whether medicine or food.

The matter vomited was at first a glairy white-of-egg-looking fluid, simple gastric mucus; eventually it became yellow and green. Examination of the epigastric and hypochondriac region failed to detect any tumour or irregularity. The region of the liver was not larger than natural. All remedies failed to control the vomiting, and he gradually sank and died October 8th.

The post-mortem examination did not reveal that degree of disorganisation which the man's antecedents suggested. The lungs and heart were free from morbid change. The lining membrane of the stomach was injected and much softened. The kidneys were of ordinary size. The cortical surface rough and slightly granular. A section displayed the cones of natural aspect, and the cortical part of the usual relative breadth.

A microscopic examination exhibited the tubular structure of the cones natural. The convoluted tubes of the cortical part were filled with granular cells and granular matter, and some of the glomeruli—(Malpighian bodies) seemed filled with this material—isolated fat grains were apparent in small proportion. The epithelial cells lining the straight tubes of the cones were quite healthy in appearance. The liver weighed forty-four ounces, the capsule was densely fibrous and firmly adherent, and over the left lobe, it was dense and firm as tendon, was about one fifth of an inch in thickness and white in colour. The capsule of the spleen was in like manner dense and thickened.

The appearance under the microscope of a thin section of the liver was as if the hepatic cells had lost their nuclei, so completely obscured were they by granular matter accumulated within them, no pigment was seen. Towards the surface the cells appeared meshed in the fibrillæ, which seemed to penetrate from the fibrous capsule among the hepatic cells.

There are several features of interest and importance in the record of this case.

1st.—The fact of life not only being prolonged for five years, after suffering from renal dropsy, typical of the most fatal form of morbus Brightii; but in that interval the general health was excellent.

2nd.—The man's life was cut short—not so much by the effects of renal disease,, of which evidence existed; but from hepatic and gastric disorder, originating without doubt in the unfortunate habits of the man. The evidence derived from the post-mortem examination showed explicitly that the renal disorder of 1860 had made no progress. It may be conceived indeed that the state of the kidneys at death could not have been of many months' duration. It may justly then be inferred, that even the most unpromising form of albuminuria may become manageable and even curable. If so, I think it not beyond the limits of probability, to conceive that this man, if his mode of life had been different, if the warning of the all-but fatal attack of 1860 had been heeded, his life would have been prolonged, and he might have been added to the list of those who are yet living examples of the curability of a disease, which has been till recently thought equally fatal and unmanageable.

It has been already shown, in Cases XX, and XXI, that there are forms of renal disease, with dropsy and albuminous urine, which are, under favorable circumstances, amenable to a particular plan of treatment. In these cases, however, the epithelial cells of the stage of hyperæmia, exhibit but faint traces of decay or abortive development. The casts rapidly lose their granular appearance, compound granule-cells appear from time to time, even exudation or pus-corpuscles may appear in the casts, but there is no evidence of any fatty deterioration of cell-growth, no clusters of nuclei, or but few, nor any evidence of that rapid disintegration of glandular epithelium which is never absent in fatal cases. It may be said of these tractable cases, that the subsidence of the disease and the convalescence of the patient are as much the consequence of the mildness of the attack as of the remedies employed. Against such reasoning may be opposed the results of observations made on chronic cases of greater severity, particularly Case XXII, in which the urinary sediment exhibited characters of advancing cell-disorganisation, but which, under treatment, gradually abated, and for a time, at least, satisfactory evidence was obtained that an improved cell-formation was re-established; or, if this be not sufficiently susceptible of proof, that the disorganizing process at least had been arrested. The evidence on which this inference rests, consisted in the diminution in the sediment of the oily casts, the less frequency of the disintegrated compound-cells, and the re-appearance of epithelial cells, slightly granular, but not fatty, and differing but little in character from the standard cell. Moreover, these changes in the urinary sediment correspond with a diminution or rather disappearance of the dropsy, with decrease in the proportion of albumen in the urine, as well as an increase in the specific gravity of the urine and an abundant excretion of uric acid. Chronic cases of morbus Brightii, it is well known, are remarkable for the exacerbations of the dropsical and other symptoms to which they are subject; so that in the course of twelve or eighteen months the dropsy ebbs and flows, increases and decreases, apparently in the most capricious manner, the cause of these exacerbations being with difficulty traced to any well-marked source. During this period, however, even if the urine becomes less albuminous, the sediment remains unchanged in character, and the microscope unequivocally demonstrates that the disease is slowly and insidiously advancing, notwithstanding the apparent improvement manifested in the general condition of the patient. These observations have reference to those cases which are not under any special mode of treatment, but in which the disappearance of the dropsy has, perhaps, satisfied the patient that his disease was cured.

But cases have come under my observation where patients suffering from chronic morbus Brightii have been kept under the influence of chalybeate remedies for many weeks, nay, months, with the effect of producing most satisfactory changes in the appearance of the urinary sediment, as well as in the general health of the patient. In some cases this improvement has been but temporary; in others it has been more permanent, or has extended over a longer period. Though it must be admitted, that if once this form of renal degeneration be established, there is always great fear that the disease will ultimately return; yet, on the other hand, when a class of remedies appear to operate fundamentally on the disorganizing process, great encouragement is offered for the more successful treatment of these disorders, if their nature be recognised sufficiently early, and the influence of such agents brought to bear before the degenerative tendencies have acquired a force beyond the power of restraint.

The following case has been selected to illustrate the influence of steel in arresting the progress of renal degeneration, because, from the very unfavorable appearances in the urinary sediment when first examined, little hope was entertained of any susceptibility to improvement. I have considered, that if in such unpromising cases a certain amount of benefit can be obtained by persevering in an uninterrupted plan of treatment by iron, there are many cases, milder in their character, and less unfavorable in the extent to which the renal disorder has reached, which may be, and are permanently cured by similar means.

Case XXIV.—Robert Richardson, æt. 34, a carman. The symptoms of this patient, on admission into King William's Ward, in May, 1858, where those characteristic of renal dropsy. An œdematous state of the eyelids and face, anasarca of the backs of the hands, extending to the elbows, and of the ankles and feet, reaching to the thigh. There was some scrotal infiltration, but the abdomen was free from fluid. The respirations were natural.

The breath-sounds were unimpaired. The pulse was 76. The tongue clean; appetite unimpaired. There was no febrile disturbance. Micturition was frequent. The urine was deficient in quantity, specific gravity 1·020, cloudy, and was highly albuminous. The patient complained principally of lumbar pain. The man's employment, as a carman, exposed him to great vicissitudes of weather. He had enjoyed good health up to last autumn. At this period he began to suffer from flying erratic pains in his limbs, which he attributed to his sleeping in his wet things. For several weeks he appears not to have paid any attention to the warnings, for it was not till near Christmas of last year, the rheumatic pains becoming worse and accompanied by vomiting, followed the next morning by diffuse dropsical swelling of the face, hands, and lower extremities, when he sought medical relief, which he received at Chertsey.

After some weeks he got better; but his dropsical symptoms again returning, he came up to London. The aspect of the patient had not the pallor usual in morbus Brightii, but there was a certain florid appearance given to the cheeks by a coarse capillary injection not often seen at this comparatively early period of life. The urine set at rest threw down a somewhat abundant flocculent deposit. This urinary sediment was examined the day after admission. The casts were very numerous, very transparent, and loaded with free nuclei. There were also a great many very large compound granule-cells, more numerous than I ever before witnessed. There were a few small very granular and oily casts. One of the most transparent of the casts, and which contained but few nuclei, had a very large compound granule-cell in its centre, the diameter of the cast being increased round its circumference. (Pl. IX, fig. 5.) There could be no hesitation in forming an unfavorable opinion on such microscopic appearances, yet experience teaches that even in these cases something may be done to arrest the headlong progress of renal degeneration.

The first object to be effected in these cases is to reduce the hydræmia; in other words, to lessen the watery state of the blood. Until that is accomplished, the reparative powers are inert, and chalybeate medicines are of no avail. He was purged actively, and had the hot air and warm baths, with the best effect, and he was placed on a nutritous diet, so that within a week from admission he was able to take the tincture of the sesquichloride of iron. He took it in a form which is both agreeable and efficacious, in combination with the liquor ammoniæ acetatis and acetic acid. I have reason to think that this combination is more effective than when the sesquichloride is given with water only. The liquor ammoniæ acetatis must be first rendered acid before the tincture is added, otherwise the ammonio-chloride of iron is precipitated, which cannot be redissolved by the excess of acetic acid.

The amount of urine passed in the twenty-four hours slightly increased, but there was no apparent diminution in the proportion of albumen present.

Four days after taking this preparation the sediment was again examined. The casts were as before, transparent, accompanied by many free nuclei. There were several very oily casts. But there were also several rhomboidal crystals of uric acid, and many more granular epithelial cells than on the first examination. On the 14th of May the urine was literally loaded with crystals of uric acid, formed within an hour of the water being passed; there were several casts, more granular than on previous occasions, with here and there an epithelial cell, deviating but little from the character of health. He complained, however, of much lumbar pain, and great irritation about the urinary passages, and frequency of micturition. The anasarca of the extremities had disappeared, but the face was slightly puffed in the morning, and there was œdema of the back and loins. He was dry cupped, with relief to these symptoms. The urine for some days containing a large excess of uric acid, the acid acetate of ammonia was discontinued. The sesquichloride was continued in conjunction with ten minims of the tincture of digitalis. On May 24th the patient was much improved. The urine contained less albumen, and the sediment was not so abundant; there were fewer oily casts, and more than one epithelial cell of the spheroidal variety was seen, with its well defined nucleus. There were many large compound granule-cells, and many hyaline casts, with free nuclei.

The result of the great increase in the proportion of uric acid was a continuation of the lumbar pain already noticed, and frequent calls to pass water. On the 31st of May these symptoms were suddenly relieved by his passing two small pieces of uric acid grit, or gravel.

Fig. 7 represents the appearance of the sediment on June 1st. A few epithelial cells are characteristic of healthy cells, but several oily casts were still present. But there were no disintegrated cells, or any evidence of a continuous advance in the direction of fatty degeneration of the epithelial cells. On the contrary, these appearances continuing for some days in succession, might be accepted as satisfactory evidence of an arrest—if only temporary—of the degenerating tendency. The condition of the patient corresponded in every respect with this apparent retardation of the disease. There was no anasarca present. The urine increased in quantity; was about forty ounces in the twenty-four hours. The albumen had notably decreased. The appetite was good, the sleep sound, and all the emunctories working favorably.

During the succeeding three weeks, the patient continued in the same satisfactory condition of improvement. On the 17th June, the urinary sediment exhibited the characters represented at Fig. 8. There had been a marked diminution in the oily and fatty casts. Disintegrated cells were still present; and from these I have been always led to form an unfavorable opinion. But in this case they appear retrograde, or diminishing in frequency. The value of frequent examinations of the urinary sediment, and their comparison one with the other, is thus satisfactorily demonstrated. In no other way could the real value of these several appearances be estimated. Abstractedly, and guided by the conditions of fatal cases, the microscopic character of the sediment in this case at first justified a very unfavorable prognosis.

The dropsy in many cases will subside, but without any corresponding improvement in the state of the cell-structure thrown off from the renal tubes. In such cases, experience tells us to be prepared for a return of the worst features of the disease. In the case under consideration, there certainly appeared to be an arrest of the degenerative processes. Hopes were entertained that the improvement would be more permanent than is usually seen in chronic cases of morbus Brightii; and encouragement may be afforded, and expectation held out, that these cases may not always be so intractable as they are generally conceived. There is much analogy between the improvement which takes place in these cases of renal degeneration, under the influence of a nutritious diet and chalybeate remedies, and that which is witnessed in several other intractable diseases. How often is the progress of phthisis arrested for a time, the expectoration decreasing, the patient increasing in flesh and strength, under the benign influence of a judiciously regulated diet and steel? In scrofulous disorders, particularly of the joints, the moment nutritive material begins to be appropriated and healthy assimilation takes place, which rarely happens without the aid of some preparation of iron, the aspect and condition of the patient immediately assumes a manifest change for the better. So in these chronic cases of renal degeneration, so soon as the watery state of the blood has been removed, every effort should be made to overcome its impoverished condition; for the moment the blood improves in quality, then, and only then, is degeneration of cell-structure arrested, and the progress of the disease checked. Depletory and lowering measures should be employed only in the early stage of inflammatory engorgement of the kidneys, and their extent and continuance should be cautiously regulated by the evidence of inflammatory or febrile disturbance which may be present. Many cases have been rendered hopelessly incurable by the patient being kept under the influence of antimonials long after the necessity for such valuable remedies has passed away. Low diet and antimonial dilutents will not supply blood-forming material; and our aim and object in these cases should be to bring the blood up to that state of healthy vigour which is absolutely essential to the function of cell-genesis. This patient left the hospital at the end of June, free from every trace of dropsy; the urine, however, was slightly albuminous, and the sediment consisted of hyaline casts, with very few isolated nuclei. There were a few compound granule-cells, and some epithelium; from the size of the cells derived apparently from the straight tubes. This case certainly cannot be considered cured; but looking to the state of the patient when he first came under observation, and the manifest alteration for the better in the character of the urinary sediment, with the subsidence of all dropsical symptoms and the diminution of the albumen in the urine, I cannot but think that great encouragement is held out for a more successful treatment of some of these cases than has been generally entertained.

In reference to the subject of treatment of dropsy connected with disease of the kidney, there is a class of remedies which, in hepatic and cardiac dropsy, may be administered with great benefit and effect, but which cannot, even in the smallest doses, be administered in renal dropsy, without the most prejudicial results. This class is the mercurial. There is a strange inexplicable susceptibility to the influence of mercury in whatever form in this state of the constitution. A single dose of calomel given in combination as a purgative will sometimes produce severe ptyalism. The repetition of small doses of the mildest preparations of this metal, with the object either of diminishing inflammatory action, or of promoting absorption or removal of the dropsical fluid, or of operating as an alterative, is almost invariably followed by severe constitutional effects, which generally hasten forward the fatal termination. No satisfactory explanation of this universal susceptibility to the specific influence of mercury in renal dropsy has yet been offered. As in other branches of our art, at present, we must be content to accept the bare fact for our guide. From no point of view does the advantage, nay, the imperative necessity, of a correct diagnosis as to the cause of the dropsy become so obvious as from this, in which the principle and method of treatment has to be considered. For that which experience proves to be beneficial in other forms of dropsy, she teaches to be undeniably injurious in this. Young practitioners, thus cautioned, will strive the more eagerly to determine whether the dropsy be hepatic, cardiac, or renal, for on the accuracy of the diagnosis will the success of their treatment depend.

### GENERAL SUMMARY OF TREATMENT.

I will venture to offer a general summary of the principles of treatment, placing in a somewhat more condensed form the chief points to be kept in view.

It has already been shown that the disease is not limited to the kidneys, that it is wide-spread in its influence, although the focus of its devastation may be chiefly viewed in those organs. It is essentially a process significant of deterioration and decay.

It must be admitted, that in the early history of these disorders, by far too exclusive attention has been paid to the state of the kidneys and the urine; and, although this condition is manifestly the key to interpret the character of the general disorder, yet remedies have been, and even continue to be given, having special reference to those organs, and those organs only.

In the early acute stage of the disorder, at a period when a tumultuous and destructive change is hurrying toward a fatal issue, remedies are chiefly selected to control the local process in the kidneys.

A distinguished physician and well-known writer on this disease (Dr. Christison), recommends strongly, and practises bloodletting in the acute stage, to moderate the inflammatory action in these organs.

Other physicians prefer local depletion from the loins, either by taking blood, or simply applying the cups.

Diaphoretics are employed to excite the action of the skin and save the kidneys; drastic purgatives, at the same time, to drain away the dropsical fluids, and husband the power of the kidneys.

Digitalis to lower and moderate the heart's action and by its diuretic action increase the outlet of fluid by the kidneys.

Tannin and gallic acid to restrain and moderate the drain of albumen by the kidneys, and uvæ ursi for a like reason.

With the exception of bloodletting, each of the above-named remedies may, according to the requirements of an individual case, be needed, particularly in the early or acute stage. Special symptoms will obviously require special remedies. But I am not dealing with the differences of individual cases, for, as regards them, each case of morbus Brightii affords a separate study; but I am desirous of drawing attention to that which is common to all—the unmistakable evidence that this form of disease represents a degeneration or decay. It is not a state to to be represented by the organism *plus* something which has to be taken away, but by the organism *minus* something which has to be added. Now that something is nutrition—nutritive elements of the nitrogenous series to supply the pabulum for fresh cells and active reproduction. Will bloodletting supply this? Will the abstraction of blood-globules from a fluid already exhausted of these, and reduced to a minimum, give aid to renewed cell-growth? In the acute form of the disease I do not affirm that diaphoretics are not needful. I do not affirm that purgatives are not often most salutary in reducing the amount of fluid accumulated in the tissues. I do not say that digitalis is not a most efficient agent in certain stages of these disorders; but I do say that they are each and all insufficient—positively harmful, if not accompanied or followed, according to their action, by agents and remedies intended to fulfil the fundamental principle of treatment, the restoration to the organism of the power of reproduction of those cells which are rapidly disappearing by processes of solution and decay.

With regard to bloodletting, I unhesitatingly assert that it is injurious: it is manifestly hostile to the fundamental principle on which the treatment of these forms of disease should be based. So long as these disorders were considered as inflammatory—so long as the dropsy was viewed as a product of inflammatory action, such treatment by venesection, or cupping, was only consistent with those doctrines. But here are forms of diseased action in which the blood itself exhibits a deficiency of its most important constituent, in which to take more blood would be but to deteriorate still more the quality of the already impoverished fluid. The œdematous eye-lids, the anasarcous extremities, the pasty, putty-like complexion, the wheezing respiration from pulmonary œdema—even though the albuminous urine be stained or tinged with blood, and hæmaturia of notable amount has been present,—signify deterioration, and decay; a depraved blood—broken down by some imperfect source of supply—or poisoned by the presence of some of the so-called blood-poisons, more especially the poison of scarlet fever, the deleterious influence of which upon the blood few will dispute, although the manner of action is yet unknown.

If we suppose the blood of the patient in acute rheumatism, or of puerperal peritonitis, to represent the most expressive form of inflammatory blood—blood characterised by the excess of the fibrine and increase in the blood-globules—a true *hyperinosis*—then the blood of albuminuria stands as its very opposite—deficient in fibrine and blood globules, a veritable *hyp*inosis. If these views be correct—if these pathological doctrines be admitted—then, *theoretically,* would not bloodletting be injurious? I have only to appeal to the experience of all physicians, and they will affirm that, *practically,* it is equally so.

If, then, the principle on which these cases of albuminuria is to be conducted be to build up and restore, rather than to take from or reduce, how and by what agents can this be accomplished?

Rest, warmth, nutritive stimuli, and blood-forming remedies (hæmatics), are the agents by which this object may be accomplished.

The very instincts, the necessity of the patient, will seek rest, so far as rest means bodily quiet: therapeutically by rest is meant something more—it is an endeavour to place all the functions of the body in a comparative state of calm, to limit the excessive action of some and bring all, so far as may be placed in our power, to what may be called the physiological state of equilibrium and repose.

This will, of course, necessitate attention to those functions which are most disturbed, and which are most readily within the reach of medicinal agents. It is, therefore, at this stage, that the action of diaphoretics and purgatives and even hydrogogue cathartics may be necessary. These latter are often productive of great benefit, by draining from the system, through their action on the intestinal villi, the serous fluid which infiltrates the tissues, and which the kidneys are totally unable to excrete. The glandular function of the kidneys is for a time in abeyance, the epithelial cells are cloudy with granular matter, which is either infiltrating the interstitial tissues of the kidney, or the cells are cast forth in tubular masses, abortive and inefficient. A drain of fluid by the intestines, relieves to a certain extent the kidneys; and it is a well-known clinical fact that in all those cases of renal dropsy in which diarrhœa occurs spontaneously, a more favorable progress is noted, than in those where the same result has to be obtained by drastic purgatives.

At this early stage of the disorder we find those differences in the degree and character of the functional disturbances, other than the renal, which render it impossible to lay down any unalterable scheme for our guidance. Every case in this respect is a study of itself.

If it be borne in mind, that the sole object of the physician in the management of a case of renal dropsy at the earlier period, is to prepare the organism for the influence of the nutritive stimuli and blood-forming remedies which constitute the fundamental measures of cure, then it will be needless to expatiate further on the various remedies which may appropriately enough be employed in this preparatory stage of treatment. A detail of the treatment of the early period, or what is called the acute stage of the disease, is unnecessary, as my object is to consider rather the principle which is to guide us in the treatment of the case which has passed from the acute to the chronic stage, and presents some favorable indications of relief.

Warmth is in itself so essential an element of nutrition, that it is only necessary for me to observe here, that a careful attention to maintain the surface of the body at an equable state of temperature by means of flannel clothing, and in the winter time to avoid all exposure to weather, are advantages which cannot be over estimated in the management of renal dropsy.

The influence of pure air, the stimulus given to the blood-forming power by the agency of pure air, is too well known to require further remark. In the management of cases in a rank of life where change of residence can be commanded, the sea-side, or resort to localities elevated in situation, and possessing the characters of what is called a bracing quality, should be selected. The influence of sea air in the treatment of chronic albuminuria is most potent, and when the means and circumstances of the patient permit, a sea voyage of some duration should be undertaken. A voyage to Australia offers less variability in the extremes of climate than one to India, and is therefore to be preferred. It must not be supposed that a hopeless or far advanced case can expect benefit; but in that form of the disease where the urine continues albuminous, with little or no dropsy, with evidence in the sediment that the disease is stationary, then the fairest hopes may be entertained of the favorable effect of such a voyage. This is neither a speculative nor theoretical opinion, but based on the evidence of several patients, two of whom may be pronounced cured, having undertaken this voyage with these hopes, and who have derived the most lasting benefit therefrom.

I turn now to the subject of nutritive stimulants.

Here I am entering on controversial ground. The consideration of the action of stimulants in renal dropsy opens up the whole question, whether alcohol is a nutritive element or not.

I shall not venture to enter into the fulness of this question, so interesting to the practical physician. The subject has been discussed from a chemical point of view, as well as from a physiological one.

I will look at it simply from the clinical point of view, without committing myself to the declaration, that wine or alcohol is a nutriment. I will venture, nevertheless, to assert that clinical observation proves it a most efficient (hand-maid) aid to nutritives.

From the clinical point of view it is generally believed that in most diseases, especially those of a low and depressed character, that the elements of nutrition are more energetically and efficiently taken up and appropriated by the aid of vinous stimuli than without them.

Clinically the result is, I believe, beyond dispute. But, can the beneficial effect of this agent be theoretically explained.

It would be out of place, and beyond my purpose, to discuss the question of the action of alcohol. But, I trust an observation on the use of vinous stimuli in renal dropsy may not be thought inappropriate.

In considering the use of vinous stimuli in renal dropsy, I would most emphatically place certain limits to their use.

First, as regards the quality or kind, as well as the amount or quantity, and *time* for use.

Secondly, as to the stage of the disease in which it is most efficient.

First, as to the quality or kind. All crude spirits derived from the distillation of grain or sugar are prejudicial; they are certainly not equally efficacious with those derived by fermentation from the grape. Brandy, whisky, hollands, gin, rum, are prejudicial, even beer is of doubtful use. The stimulants most beneficial are wines of any kind, or country, provided they are pure and sound. They must be used in moderate quantity, and always in conjunction with food, particularly animal food, either at, or immediately after the meal. They must, on no account, be taken on an empty stomach. Wines thus given appear to promote the digestion of nitrogenous substances; to invigorate the metamorphosis of the products of digestion; and to enrich the blood with material calculated to promote cell-growth. Moreover, wine in moderation, increases the chief constituent of the urine, urea; and, if this be derived from the metamorphosis of the muscular elements, it would directly show that a larger amount of nitrogenous food was appropriated, and that nutrition had become more active.

We are taught physiologically that wine diminishes the quantity of urea, for it saves tissue, and urea is derived from the metamorphosis of muscular tissue; but I would infer clinically, that wine, by promoting the digestion of nitrogenous food, increases the urea, though diminishing the amount of the metamorphosis of the tissues of the body.

The stage of the disease best calculated to feel the beneficial influence of wine is not so difficult to determine as at first might be imagined.

I believe it will be found, that except during the very commencement of the symptoms, when to the evidence of engorgement of the kidneys, through the presence of hæmaturia, there are added some degree of febrile disturbance, restlessness, thirst, inappetency, and a furred tongue, that, under every other condition of the patient, wine in moderation should be prescribed. The instant the stomach will bear animal food, or, in other words, as soon as the inclination of the patient permits it, animal food should be given in some palatable form, and its amount thereafter proportioned to the powers of the patient's digestion. At first beef-tea, or some well prepared soup is all that the stomach can, without disturbance, digest; but slowly and gradually the stomach recovers its power, and the patient begins to crave for more.

It is a most remarkable fact that the albumen in the urine *decreases* by the use of animal food, and *increases* again under a vegetable diet. I have experimentally proved this. Is it not natural then to conclude, that the nitrogenous elements of animal food are better adapted to enrich the blood with the elements of cell-forming power in these diseases where that power is deficient, than can be expected or gained from any form of vegetable diet?

But animal food, even with improved powers of digestion, though aided by wine, will but slowly impart to the impoverished and watery blood, the nutritive material necessary for its restoration, to fit it, in its turn, for the support and nutrition of the tissues.

The preparations of iron have long been justly regarded as instrumental in helping to enrich the blood with red corpuscles; and hence appropriately enough called hæmatics. In all cases where there is evidence of a poor defective blood, called by whatsoever name, anæmia, spanæmia, leukæmia, in the sequel of many acute diseases, whether as the result of treatment by bleeding, as was formerly the case in acute rheumatic fever, or from the blood-destroying character of the disease itself, as in the convalescing stage of most fevers, whether continued or intermittent, the rapid and beneficial restorative action of chalybeate medicines or steel, as it is popularly called, particularly in conjunction with animal food and wine, is universally acknowledged and confirmed by daily experience. The preparations of iron in the 'Pharmacopœia' are numerous, but there is one which in these cases of renal dropsy stands preeminent for its efficacy, and should be preferred in these cases before all others. It is the tincture of the sesquichloride. But it is not as a sesquichloride that its efficacy is most perceived in these cases. It is as an ammonio-chloride, kept in solution by acetic acid, that its beneficial influence becomes most apparent. It is a very simple preparation, a few drops of the tincture, according to the age of the patient, are added to a drachm of the liquor ammoniæ acetatis, previously acidulated with acetic acid.

If this be not done—if the sesquichloride is added to the neutral liquor, an insoluble ammonio-chloride falls, which is with difficulty again taken up; but, if the saline is first acidulated a beautiful sherry-red fluid is produced, which is neither unpalatable, nor liable to decomposition, and may be kept any time. The tincture of the sesquichloride has long possessed the favorable opinion of physicians in most cases of renal or genito-vesicle disorder.

It has been supposed to act almost specifically in dysuria from spasmodic conditions of the sphincter of the neck of the bladder. Dr. Parkes, in his excellent work on the Urine, p. 395, thinks that the sesquichloride in morbus Brightii, reduces the quantity of water, and probably, in some instances, the albumen. So far, however, as my observations enable me to judge, these conditions, more particularly, the diminution of the albumen, or the alteration of its chemical character, that is, its conversion into the condition of albuminose, a modified albumen, does not become evident till proofs are equally present by the diminution or disappearance of the dropsy, and the altered character of the cells and casts thrown off from the kidneys, that a blood, richer in all the elements of cell-growth has been produced.

It has fallen under my observation that in the long period which elapses while these beneficial results are progressing, that the albumen thrown off with the urine undergoes certain modifications, and passes from the ordinary condition, so familiar to us as coagulating by heat and nitric acid, into one which the chemists have called albuminose, or modified albumen, and which has been regarded as an oxidized form of albumen, and called the deutoxide of albumen. I think that when it is discovered that the albuminous product has undergone this change a more favorable opinion may be expressed as to ultimate and permanent recovery, than where, notwithstanding the disappearance of the dropsy and the general improvement in the health of the patient, the urine continues to exhibit, although in decreasing quantity, the presence of albumen in its ordinary form.

I will venture, then, to conclude that renal dropsy—dropsy with albuminous urine—is significant not only of various forms and degrees of kidney degeneration, but of a decadence and consequent failure in function of almost all the other tissues of the body. It would appear to be significant of a wide and all but universal defect in the formative or cell-forming agency.

If we adopt the physiological view, that healthy cell-development depends on the selection of highly nitrogenized material for the nucleus, as well as for the contents of the cell, that cell representing the highest degree of vital activity and energy in which the nitrogenous nucleus is the most concentrated: then viewing the development of less healthy cells, the power of selecting or condensing nitrogenous matter grows weaker and weaker, till in the lowest forms the cell contains but an albuminous fluid with hydrocarbon granules, oftentimes fatty, perhaps amyloid, and consequently totally inefficient for all functional purposes of secretion.

From this point of view I will venture to submit that our methods of treatment should more decidedly embrace the principle of nutrition and support; that our main object should be to invigorate the powers of the organism; that we should call to our aid whatever is calculated to maintain and promote the force of cellular reproduction, so that, by these means, the decaying powers may, if possible, be revived.

Guided by such principles, many cases which at first afford but faint prospect of relief, pass from a stage of imminent danger to one of hope and encouragement; and eventually either permanently recover, or at least give assurance that a form of disease which was but lately thought incurable may be brought within the category of those which are remediable and tractable.

# CHAPTER XV.

## RENAL DROPSY ASSOCIATED WITH OTHER DISEASES, PHTHISIS, CANCER, ETC.;

## RELATION OF MORBUS BRIGHTII TO PHTHISIS.

*Tubercular deposits in both lungs—acute phthisis—albuminous urine—death by asthenia—kidney mottled, not enlarged, but infiltrated with fat and granular matter.*

Case XXV.—J. Darnton, æt. 23, a gardener, admitted March 17th, 1857, with well-marked symptoms of acute phthisis. He had been suffering from cough for two months, but continued at his employment till within the last week, when the increase of his cough, with expectoration and shortness of breath, compelled him to relinquish work and seek admission.

The chest was narrow, and ill-clothed with muscle. The clavicles were very prominent from the hollow depressions beneath; there was defective mobility of the chest, dulness at the apex of both lungs, defective respiratory murmur, prolonged jerking expiratory sound in left apex, less marked in the right, and some gurgling on deep inspiration. The urine was clear, not deficient in quantity, and albuminous. There was some swelling of the wrists, and slight anasarca of the ankles a week before death. The urinary sediment was only examined once, six days before he died. (Plate VI, fig. 9.) He lived a month and died from asthenia. There were no particular symptoms other than phthisis usually exhibits.

The body was much emaciated. Dense firm adhesions united the apices and upper third of both lungs to the costal surface.

Both lungs were nearly solidified with the extent of the diffuse tubercular (gray) deposit. There were a few small ragged cavities, none exceeding a marble in size. Many of the tubercular spots did not exceed the diameter of a pea, and were in the stage of early softening. The heart was not increased in size, but it was pale and flaccid; its fibres were fatty. The mesenteric glands were the seat of tubercular deposit, some few were soft and cheesy. The kidneys were but slightly enlarged; they weighed respectively five and three quarters and six and a half ounces. The capsule was easily removed, though slightly adherent, and the cortical surface then appeared coarsely granular, pale, slightly notched, and covered with stellar vascular groups. The granulations in one kidney were larger than the other, and almost reached the size of mustard seeds. A section of the kidney showed the cortical portion of a pale tint, with dark coloured lines or vascular markings perpendicular to the surface, in the direction of the base of the cones. This pale deposit seemed encroaching on the pyramids. In the centre of one of the cones was a mass of an oval shape of yellowish deposit, surrounded by a well-defined margin of red vascular injection. The centre of this deposit was softer than the rest; it was of a deeper buff colour, and of a jelly-like consistence. The microscopic aypearance of this deposit is represented in Plate VI, fig. 13. A great deal of coarse amorphous granular matter was diffused over the field, amongst which were dispersed large glistening fat-cells, many free fat-granules, and a few epithelial cells, both abortive and fatty. Several disintegrated compound cells were also present. The urinary fluid obtained by pressure from one of the cones contained granular matter, free fat-granules, compound fat-cells, and epithelium more or less degenerating. Some of the straight tubes teazed out presented the appearances of fig. 11. The canal of these tubes was apparently permeable, but having glandular and fatty matter and detached cells in the canal. The figures *a* and *b* represent the same tube under alteration of the focus by transmitted light; *c* is a tube from the base of one of the cones. The epithelium appears detached from the basement membrane, and the canal is choked with granular and fatty deposit. One of the larger granulations of the surface of the kidney in proximity to the area of the asteroid vascular spots, presented the appearance of several Malpighian bodies stuffed with a dense granular and fatty deposit, in which abortive epithelial cells were mixed, and which, by the pressure exerted on the canal of the vessel, seemed effectually to obstruct the passage of blood through it. (Plate VI, fig. 12.) The muscular structure of the heart exhibited the characteristic appearances of fatty degeneration in an early stage, as transverse striæ were seen in fibres that were partially fatty. (Fig. 14.) The liver was fatty, the hepatic cells being loaded with fat-granules.

Is there any relation between pulmonary phthisis and morbus Brightii? Is the co-existence of one form of Bright's kidney with tubercular disease of the lungs accidental or essential? Our present knowledge does not entitle us to say more, perhaps, than that this relation is apparently not more definite than what exists between the cancerous diathesis and fatty degeneration of the kidney, or what may be seen to exist in all those forms of chronic disease characterised by decay or degradation of cell-structure, whether that degradation assume the malignant form of cancerous deposit, or the not less fatal one of diffuse scrofulous degeneration.

It cannot be doubted that the scrofulous habit of body is specially disposed to the development of one form of degeneration of the kidney, so that in those cases of phthisis in which the scrofulous taint is highly marked, we may expect to find evidence of renal degeneration partaking of that type which characterises the tubercular diathesis, and find the structures infiltrated with an oleo-albuminous exudation, and the cells becoming vitiated and abortive in the highest degree of fatty decay. Dr. Bright considered that there was no essential relation between renal degeneration and phthisis. Indeed, he thought that there was something of antagonism between them, and that renal disease was hostile to the development of phthisis. The pulmonary complications which are always found more or less active in both the acute and chronic forms of morbus Brightii, are certainly not in the direction of tubercular deposit. Bronchitis, or bronchial catarrh with dropsy of the pulmonary parenchyma, or pleurisy with effusion, or pneumonia of a low type, are the most frequent and most fatal complications. It is very certain that if tubercle does not exist in the commencement of the renal disturbance, it rarely forms in the progress of that disease, however protracted. Dr. Bright's opinion is, therefore, to this extent confirmed by observation, that where tubercles do not pre-exist, renal disease is not favorable to their development. But the subject may be considered from another point of view. Is the tubercular habit disposed to develop renal degeneration in any form, and if so, what form? The question is not whether the kidneys suffer from tubercular deposit, but whether, in the progress of phthisis, or associated with the tubercular dyscrasia, there be any disposition in the renal textures to suffer any of the forms of degeneration usually classed as morbus Brightii. I think this question must be answered in the affirmative to this extent—that frequently in phthisis, probably as the result of the general vitiation of the tissues, we find one form of fatty degeneration of the kidney, not always, but so frequently as to give rise to a surmise that the connexion is not accidental. In these cases the kidneys are not much increased in size. The capsule is easily detached and the cortical surface may be granular or smooth. Microscopically, the Malphigian bodies, as well as the convoluted tubes, are seen filled with granular abortive epithelium, more or fewer free fat-granules, compound fat-cells, and in some cases the fatty matter may be so abundant as to look like oily drops.

In the centre of one of the pyramids was a deposit of a yellow white colour, surrounded by a well-defined red areola, an example of the *Plaques blanches de lymphe plastique* of Rayer; these have sometimes been erroneously thought to be tubercular. We are ignorant of their cause, for they are met with in very different morbid states, and even found in kidneys not otherwise diseased, so that the granular, fatty, and degenerated kidney has no connexion with these apparently accidental and isolated deposits.

The inquiry seeks a solution from general, not from local causes, and asks whether this, or any form of renal degeneration, has any connexion with the tubercular habit of body. Whether the tubercular diathesis, expressed as it is by vitiated processes of nutrition, is not frequently associated with renal degeneration, not accidentally, but as a consequence of those depraved processes. It is very certain that in all those cases of phthisis which have fallen under my observation, in which the kidneys were granular or fatty, the heart-fibre was found to exhibit unequivocal indications of fatty degeneration, either incipient or advanced.

*Connexion of morbus Brightii with phthisis—tubercle in the lungs running a chronic course—extensive anasarca—albuminous urine, with deposits highly fatty and granular—kidneys in the highest state of fatty degeneration.*

Case XXVI.—John Thompson had suffered from phthisis for a long period; he had been a patient at the Brompton Hospital; he was subsequently admitted into the Westminster, under Dr. Hamilton Roe, under whose care he continued till that gentleman's resignation of office, when the patient came under my observation. There had been extensive anasarca of the lower extremities, as well as of the face and hands, but this had subsided to a great extent when I took charge of the patient, in the middle of March, 1857. The urine was at this time abundant in quantity, pale, of a low sp. gr. 1010, and threw down a most abundant coagulum by heat; a flocculent cloudy deposit was precipitated when the urine was set at rest in a tall glass. The first examination was made on March 17th, and from the appearances then, as well as those of the following day, I had no hesitation in expressing an opinion that this case would exemplify a very high degree of fatty degeneration of the kidney.

The field exhibited many very large compound fat-cells, some disintegrated; some granular casts studded with free fat; some isolated granular masses, also fatty; many compound cells, both granular and fatty; many abortive epithelial cells, and even the form of epithelium known as the pavement was both granular and fatty. (Pl. VII, fig. 1.) Notwithstanding the subsidence of the dropsical state of the surface, the urine continued highly albuminous, and the flocculent deposit obtained by allowing the urine to settle assumed a mucoid character. This precipitate was resolved by the microscope into masses of epithelial cells, of every variety belonging to the urinary organs, all of which were either fatty or exhibited the characters of abortive development. There was a great deal of free amorphous granular matter mixed with free fat-granules. The whole deposit had a slight viscous consistence, which in all probability arose from the disintegration of many abortive epithelial cells, yielding their granular and fatty contents, as well as their mucus, to the fluid in which they had become broken up. Each examination of the urine to the time of the patient's death, in May, yielded similar appearances. (Pl. VII, figs. 2, 3, 4.)

Large glomeruli, compound fat-cells, were always present in abundance, as well as highly fatty tube-casts. The patient died the first week in May. The dropsy had increased during the last few weeks. The lungs contained tubercular deposits, some in an active state of ulceration, producing one or more small cavities. One mass of tubercle in the apex of the left lung, about the size of a marble, was of a cheesy consistence, and was easily turned out of what appeared to be a capsule surrounding it.

The liver was nodulated—commonly called hob-nailed. The heart was small, the muscular substance pale and flaccid, and gave evidence under microscope of fatty degeneration of its fibres. (Pl. VII, fig. 9.) Two patches of maculæ albidæ on the heart had slightly elevated edges, which enabled the white opalescent film to be easily peeled off. The kidneys were slightly increased in weight, they weighed severally six and six and a half ounces. When the capsule was removed the cortical substance presented a smooth glistening appearance, a spermaceti or wax-like brightness. Here and there minute arborescent vessels were seen.

Towards the concave border of both kidneys the surface was studded with minute sabulous grains of deposit: it gave to the surface a scabrous, rather than a granular appearance, and contrasted strongly with the smoothness of the convex portion. A section of the kidneys displayed the cones of a light salmon-flesh tint. The cortical portion presented well-marked thread-like markings, perpendicular to the surface, as of a deposit of a material glistening like spermaceti. When the kidneys were placed in water the external surface, as well as this section of the cortical part, presented an appearance of being studded with minute glistening grains of a wax-like brightness.

This as well as the former case illustrates the connexion of renal degeneration with the tubercular diathesis. The urinary deposits during life were very characteristic, and afforded evidence of the special form of kidney disease which was present.

The microscopic appearances of these kidneys illustrate the degeneration of epithelial structure and the fatty deposit in the tubes in a very advanced form. The cells from every part of the urinary passages presented indications of this decay even during life, and the post-mortem conditions showed the extent which this process had reached in the cortical part of both kidneys. The minute sand-like grains of glistening appearance were perhaps some Malpighian tufts, stuffed with free fat. The abundance of the compound fat-cells would serve to indicate the extent and rapidity of the morbid process.

An examination of the tubular structure at the base of the cones, and of a tube taken from the apex, illustrate perhaps no new fact; they nevertheless clearly demonstrate that the progress of degeneration is from without inwards. The tube from the base of the cone is filled with abortive cells and free fat, its walls are deprived of epithelium, and one tube appears filled with nothing but fat and granular matter; while a tube from the apex of the same cone presents the epithelium lining the tube scarcely altered in appearance; a few fatty granules appear in one or two of the cells; and the centre of the tube appears filled with the débris of cells brought down from the base of the cone.

### CANCER IN CONNEXION WITH MORBUS BRIGHTII.

Case XXVIII.—A woman about thirty-six years of age, C. B—, a patient of my friend and colleague, Mr. Holt. whose breast he had removed for cancer, became extensively anasarcous. About six weeks after the operation, some trifling febrile disturbance was followed by hæmaturia, which Mr. Holt at that time thought significant of cancerous deposit in the kidney. I did not see the patient till some six weeks after the occurrence of the hæmaturia; from that period the dropsical condition increased, and when I saw her, both upper and lower extremities, as well as the abdominal cavity, were the seat of dropsical infiltration. The urine had become pale lemon-coloured, of low specific gravity, and abundantly albuminous. The casts which were found in this urine were finely and delicately granular; they were loaded with free nuclei, both in groups, and scattered. The cells, few in number in the casts, were highly granular and fatty, and the corpuscles scattered, and free compound fat-cells, and abortive epithelium. (Pl. VIII, fig. 1.) I had no hesitation in expressing an opinion that the case was one of rapidly advancing fatty degeneration of the kidney. She lived about a fortnight.

At the post-mortem examination the kidneys were found slightly increased in size; they weighed severally six and three-quarters and six ounces. In consistence they were flabby and soft. The colour very pale, and of a waxy whiteness. The capsule being removed, exhibited the cortical surface smooth and glistening, with a few arborescent vessels disposed here and there.

The tubes of the cortical part, when teased out with needles, appeared filled with glistening resplendent fat-grains and epithelium, fatty and abortive. Some tubes, as represented at fig. 4, contained only fat-grains, and those in which cell-structure was still apparent presented cells differing materially in character from the ordinary glandular epithelium of these tubes. They were very small, granular, and seemed to choke up the tube, rather than to form any part of its structure. The tubes of the pyramids were of ordinary appearance; within the canal, however, were many compound cells and free fat-grains.

The heart was small and flabby; the muscular structure of the ventricles had a dirty look, not the bright colour of well-nourished muscular flesh, and under the microscope very few transverse striæ of the muscular fibrillæ could be found. The fibres were everywhere fatty and degenerated. (Fig. 6.)

I regretted very much that I had not seen this case from the period of the hæmaturia, and that I had no opportunity of examining the urine till within a fortnight of her death. No cancerous deposit existed in the kidneys, nor in any other tissue of the body that was examined. The interval between the incipient stage of hæmaturia and the death did not exceed three months. She was under observation as in-patient the whole period. On admission her general health appeared good and favorable for the operation, or Mr. Holt would not have undertaken it. Yet six weeks after the operation, the wound not having gone on very favorably, without any obvious exciting cause,—confined to bed, and watched and cared for and supplied with every necessary want; a slight febrile disturbance is accompanied by blood in the urine, followed by rapidly increasing dropsy, and the patient dies in less than three months, with kidneys in the most advanced stage of fatty degeneration. The case confirms my opinion that an incipient stage of subacute inflammatory engorgement is the starting point in some cases from which issues the rapidly degenerative processes by which cell-growth becomes abortive, degraded, and fatty. Although there were no well-marked characteristics of the scrofulous habit, yet the fatty degeneration of the heart-fibre would show how widespread must the tendencies have been in the direction of imperfect nutrition and consequent decay.

## CHAPTER XVI.

### DROPSY AND ALBUMINOUS URINE IN CONNEXION WITH PREGNANCY.

Œdema of the feet and ankles is a symptom of such frequent occurrence in the later and advanced periods of pregnancy, that to associate it with dropsy, or gravely to consider it a morbid condition, would be justly considered an excess of pathological refinement. Yet this swelling of the feet and ankles, which is, in the majority of cases, but a temporary inconvenience, arises from causes similar to those which may in certain cases produce a more general dropsy, and even give rise to much distress and serious alarm, if not correctly interpreted. The pressure of the gravid uterus interferes more or less with the free circulation of blood through the common iliac veins and vena cava, and this obstruction produces a swollen or œdematous state of the ankles and feet. The horizontal position relieves the pressure, and the swelling disappears. After delivery, with the removal of the cause, the swelling does not return.

In other cases, however, the influence of the gravid uterus extends further, and by pressure on contiguous parts indirectly interferes with the circulation in the more important abdominal organs. This indirect pressure may be exercised as high up as the hepatic duct, and give rise to jaundice, which also quickly disappears after delivery. Such cases, however, are not of common occurrence. It occasionally happens that the swelling of the ankles and feet gradually increases and extends higher up the extremities, involving the thighs, and producing an anasarcous condition of the inferior parts of the abdomen. Even the arms and back of the hands may swell. The patient becomes alarmed. The medical attendant is sent for. He finds the urine scanty, dark-coloured, containing blood perhaps, and it is albuminous. These symptoms appear formidable. They are such as express the early stage of morbus Brightii, and they are calculated to excite the gravest apprehensions. But the patient goes her full time. Delivery takes place; the dropsical state rapidly disappears; the urine, which had continued albuminous up to this period, becomes abundant, free from all trace of albumen, and altogether healthy. These apparently formidable symptoms have been brought about by the indirect pressure exercised by the gravid uterus on the emulgent veins, and obstructed circulation through the kidneys follows—engorgement, hæmaturia, albuminous urine, and dropsy succeed, and continue so long as the uterine pressure continues; that removed, the unobstructed blood freely flows, and secretion goes on unimpeded, and for a time even with increased activity. The kidneys, in these cases, do not appear to suffer any permanent mischief, or exhibit any tendency to subsequent disorganization. Dropsy, therefore, even with albuminous urine, in connexion with pregnancy, may be of no serious consequence. But there are cases in which, either from the peculiar idiosyncrasy of the patient, or from exposure to the exciting causes of renal inflammation, or from the existence of renal disorder previous to conception, permanent disorganization of the kidneys takes place, and confirmed morbus Brightii is the result.

It may be easily conceived that in special constitutions, the scrofulous for instance, the amount of renal engorgement produced by pressure on the emulgent veins continuing for some weeks, may lead to such modification of cell-structure in the convoluted tubes and Malpighian bodies as to lay the foundation for the more serious disorganization which follows; and therefore, in such cases, we may not be surprised to find that although after delivery the dropsical condition has rapidly disappeared, yet that after a few weeks it has returned, and with it urine highly albuminous, as well as other indications of hydræmia, so characteristic of renal dropsy.

If the renal disorder has either pre-existed or has been excited at the period of, or even subsequent to conception, then those concomitants of the disease, of which the quality and character of the blood are not the least remarkable, exercise a palpable influence over the development of the ovum, and abortion is almost certain to ensue. Experience justifies the assertion, that a female pregnant, and otherwise *apparently* healthy, exposed to any of the ordinary exciting causes of renal dropsy, will just as readily suffer as if pregnancy did not exist. The reason why such cases are not more frequent may be found in the greater care with which a woman's habits are regulated who is conscious of pregnancy, and consequently that exposure to cold and wet, sudden chills, &c., are scrupulously avoided; and, moreover, that this form of dropsy, the renal, is not so common among women as it is in the male sex. There are thus two forms of dropsy which may coexist with pregnancy—one limited in duration, dependent on and caused by indirect uterine pressure on the emulgent veins, and disappearing rapidly after delivery; the other arising from structural changes in the kidneys, quite independent of and unconnected with the state of the uterus; usually leading to abortion; or, if the patient goes her full time, returning after parturition, and running a chronic and perhaps intractable course. The symptoms which characterise these two forms, springing as both do from the kidneys, have necessarily much in common. There is little to distinguish them. The extent of anasarca does not differ. In both the urine may be scanty and high coloured; in both it is albuminous. There is frequency of micturition in each, the respiratory function may be disturbed, and the heart's action hurried and irritable. Diarrhœa may be a symptom in each, or head-symptoms may be present in either. From symptoms so similar—they may be called identical—a correct diagnosis is with difficulty formed, but a microscopic examination of the urinary sediment will promptly decide the point.

Case XXVII.—Catherine M—, aged 26, a married woman, the mother of five children, three of whom are living, was admitted March 27th, suffering from general dropsy. The face was œdematous, as were also the back of the hands, the arms, legs, thighs, and lower part of abdomen. This cavity also contained fluid. The breathing was much oppressed, and the respirations frequent and short, accompanied by a troublesome cough, with very scanty expectoration of a catarrhal mucus. The stomach was irritable, and there had been occasional vomiting. The pulse was small and frequent, but its ratio to the respirations was not increased. Her water was scanty, and micturition very frequent, disturbing her rest. The water was of a pale colour, highly albuminous, and threw down at rest a somewhat copious deposit of a flocculent appearance. Its character is represented Pl. IX, fig. 1, and consisted of every variety of epithelial structure to be found in the urinary organs. Some hyaline tube-casts, containing a few glandular epithelial cells; here and there a pus-cell; several large compound granule cells, and several botryoidal clusters of fat-granules. The various forms of epithelium were mostly held together in groups, as if adherent or coalescing by some viscid secretion accompanying them. Some of the casts were very granular. Many of the isolated epithelial cells were of aborted appearance, having four, five, and six nuclei. An unfavorable opinion was expressed as to the termination of the disorder, for no doubt could be entertained from these appearances in the sediment that the kidneys were rapidly degenerating. The patient stated that during her first two pregnancies her health continued good, but that on the occasion of her third pregnancy she noticed that her feet and ankles would swell to an inconvenient extent. At this period she was employed in a laundry, and exposed constantly to wet feet; and from her shoes being bad she would stand for hours in all but naked feet, wet and cold. She went her full period, and all the swelling went away immediately after delivery. At her fourth pregnancy, precisely the same symptoms occurred, and left her as before. On her fifth pregnancy, at the same period, about the fourth month, she again had anasarca of the lower extremities, and some swelling of the backs of the hands; but all these symptoms of dropsy disappeared on her prematurely giving birth to her last child, which occurred at the eighth month. The child did not survive. She continued free from dropsical symptoms for ten months; but five weeks before admission, after exposure to bad weather and also to the wet of the laundry in which she worked, the swelling again returned, rapidly progressed, and increased to her present condition. She is now five months gone with child. At the commencement of this last attack she noticed that her water was the colour of blood, and she retained but little at a time. There were no signs of heart-disease, and the sounds of respiration were feeble, with the addition of mucous murmurs in the large tubes.

As the bowels were sluggish, she took the compound jalap powder each morning, and the infusion of digitalis and bitartrate of potash three times a day. The amount of urine increased, but the dropsical condition nevertheless continued on the increase, and so great had the tension of the skin of the lower extremities become, that punctures became necessary, from which she derived some temporary relief. The dropsy, however, did not subside: the breathing again became distressed, from the œdematous state of the pulmonary parenchyma.

The urinary sediment at four days' interval, March 31st, April 4th, and April 7th, is represented in Pl. IX, figs. 2, 3, 4. The urine was highly albuminous, and the sediment thrown down when at rest had the same flocculent aspect and exhibited very similar microscopical appearances on these several occasions: great variety of epithelial structures; pus-cells, epithelium from the straight tubes, from the calyces and pelvis, as well as from the bladder and meatus. Several very granular casts were visible, a few transparent ones, the former containing a few free nuclei, several compound granule-cells, and here and there some colourless granular flakes. As the punctures brought but little relief to the tension of the lower extremities, two incisions through the areolar tissue down to the fascia were made with a lancet above each inner ankle, and with the effect of bringing away a considerable quantity of water. Nevertheless the dropsical state of the upper part of the body was unrelieved. The œdematous state of the lungs was shown in the short and frequent respirations, occasional cough, but without any physical signs within the chest of bronchitis or pneumonia. The compound jalap powder produced but little effect in acting on the bowels, and notwithstanding the risk of bringing on premature labour, it was decided to give a small dose of elaterium. It was very evident, from the increase of the dropsical effusion in the chest and abdomen, that nothing but some hydrogogue cathartic could prevent the patient succumbing to the effusion of water into the parenchyma of the lungs.

She took a quarter of a grain, and it produced two watery dejections, with some relief to the breathing. The same day premature labour came on, and she was delivered of a six-months' fœtus. Any anxiety arising from the belief that the effects of the elaterium had its share in bringing on abortion, was removed by the certainty that the child had been dead for two or three days previously, and this was corroborated by the statement of the patient, that she had ceased to feel its movements for from three to four days.

Mr. Newcomb assured me that the fœtus had a livid, drowned appearance; and the placenta was macerated, sodden, and very friable. Had the gravid uterus any share in producing the dropsy, we should have expected that many of the more urgent symptoms would have abated after the removal of the contents of the womb. But convinced from the microscopic character of the urinary sediment that one form of morbus Brightii was the cause of the dropsy, I was scarcely surprised that each succeeding hour added to the gravity of the symptoms; and although the incisions through the cuticle above each ankle had reduced the tension of the lower extremities in a very satisfactory manner, yet the dropsical accumulation in the chest and abdomen remained undiminished. The respirations became short and husky, a semi-comatose state followed, and she died in the morning of April 11th.

The body was removed by the relations immediately after death. Being Irish, they exhibited their characteristic prejudices against a post-mortem examination. The character, however, of the urinary sediment left no doubt on my mind as to the nature of the renal disease which caused the dropsy. In the absence of post-mortem evidence, it would be idle to speculate on the form of kidney disease which gave rise to these symptoms. The character of the urinary sediment, when first examined, led me at once to pronounce the case as hopeless. I had no hesitation in saying that the dropsy would not disappear after the delivery, and I ventured to express my fears that abortion would in all probability take place, and a fatal termination speedily follow.

A microscopic examination of the urinary sediment in any similar case will enable the physician at once to determine whether the dropsy be dependent on pregnancy only, or the more formidable conditions of renal disorganization.

The sediment in this case was remarkable for the great variety of epithelial structures which it presented.

The well-known fact that the urine sometimes becomes albuminous during pregnancy, rapidly disappearing after parturition; also, that a woman may conceive who is suffering from the early stage of morbus Brightii, and consequently has albuminous urine throughout her pregnancy; also that these latter are peculiarly subject to puerperal convulsions of a grave and often fatal character, has raised the question how far the state of pregnancy may operate as a predisposing cause of morbus Brightii.

Some writers conceive that pregnancy is a fertile source of this disorder; others are sceptical on this point.

Dr. Roberts, in his excellent work on 'Urinary and Renal Diseases,' discusses this point, and brings forward (p. 289 and following) some statistics to support the view.

My own experience is certainly opposed to these conclusions. That a young woman of scrofulous taint may conceive, in whom on marriage there existed no apparent signs of renal disorder, but whom there needed but slight disturbance in the equilibrium of the renal circulation, and which was furnished by the pressure of the gravid uterus, to produce the congestion or preliminary engorgement of the renal vessels to be followed by the full development of the disease, is not improbable; but that an otherwise healthy woman should, out of the passive congestion of the renal organs consequent on pregnancy, and apart from the ordinary exciting causes, become peculiarly susceptible to so serious a disease, is certainly not consistent with my own personal experience, nor is it with that of some distinguished metropolitan obstetricians, nor even with some statistics which have been collected to illustrate this view of the question.*

Women are less frequently the subject of renal dropsy than men. This doubtless arises from their being less under the influence of the most fertile source of the disease—exposure to cold and wet and the abuse of ardent spirits and fermented drinks.

The question of the relation of pregnancy to morbus Brightii might be viewed from this latter position. Would a pregnant woman of intemperate habits and exposed to the influence of cold and wet be more likely to suffer from this form of renal disease, than a non-pregnant woman under the same predisposing circumstances? The answer must certainly be in the affirmative; but then the circumstances are altogether exceptional, and can have but little bearing on the fundamental point whether pregnancy *per se* can be considered as a predisposing cause to morbus Brightii. My own conviction is that it is not.

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* See a Lecture, by Dr. Harley, 'Medical Times and Gazette,' December 16th, 1865.

# CHAPTTR XVII.

## ALBUMINURIA WITHOUT TUBE-CASTS—NON-TUBULAR.

It occasionally happens that all the symptoms of renal dropsy may exist without the sediment of the urine containing any of the characteristic tube-casts; in the place of which, however, pus-cells, isolated or cohering in groups, and even arranged in a tubular form, and evidently derived from the uriniferous tubes, are among the characteristic objects in the sediment.

### *General anasarca—Flaky deposit of pus-cells coherent in masses with epithelium from the calyces, pelvis, and ureters of the kidneys—Membranous débris stained with hæmatin.*

Case XXVIII.—This case is worthy of notice, from the sediment of the urine presenting some exceptional conditions to what are usually found in albuminous urine associated with general dropsy. The urine for many weeks had been highly albuminous, of a comparatively high specific gravity—1026 to 1030; micturition had been frequent, and the amount of urine voided each time was small in quantity. There had been more or less lumbar pain, and the anasarca, though not very great, had involved the legs and backs of the hands; there had been puffiness of the eyelids and face for a few hours in the morning, subsiding as the day advanced.

These are all characteristic symptoms of renal dropsy. The urine had the usual albuminous character, except that, on one occasion only, have tube-casts been seen in the sediment.

The deposit had uniformly consisted of pus-cells, isolated as well as aggregated together in flaky masses. More or less of the epithelium of the calyces, pelvis, ureters, and bladder, had latterly been associated with these coherent flakes of pus-cells. The microscope alone revealed these conditions; for, to the unaided eye, the urine presented none of the features of purulent urine. Set at rest, there was seen but a faint, flocculent, cloudy deposit, in which were a few membranous-looking flakes. The microscope resolved these into aggregations of epithelium and pus-cells.

The patient whose urine exhibited these characters was John S—, æt. 46, a man of large and powerful frame, of an aspect not unhealthy; by occupation a navigator, for which work his strong, muscular build ably fitted him. He was admitted on the 13th January. The tongue was slightly coated, the skin cool, the pulse small, but not frequent. The bowels were reported as regular, the appetite undisturbed, but the sleep broken by the frequency of micturition. The urine was scanty, high-coloured, and of specific gravity 1030, and was highly albuminous. The patient complained of giddiness, muscæ volitantes, and headache. He suffered also from paroxysms of lumbar pain. The ankles were anasarcous, extending nearly to the knees, the backs of the hands were œdematous, and the eyelids were stiff and swollen in the morning. About ten months previously he had been under the care of one of my colleagues for similar symptoms. He returned to the country, and drank largely of infusion of herbs, apparently, from his description, of the *Spartium scoparium*. He was in a workhouse infirmary, where he was cupped. Finding his symptoms returning, he came back to London, and applied for admission. He confesses to have been a hard drinker, and careless of all consequences. It had been his habit to sleep his potations off as readily in a wet ditch as in the shelter of a cottage. It was after one of these "bouts" that he first became ill. Till then he had never had a day's illness, and must have been a good sample of that iron-constitutioned race, well-known as the "*English navvy.*" The urine was examined microscopically;

the sediment consisted of pus-cells, coherent together in large fields, a few large granule-cells were apparent, and membranous flakes stained with hæmatin. One or two very delicate flattened films studded with nuclei were also present. (Pl. VIII, fig. 12.) He was ordered the compound jalap powder, and two days afterwards, as there was much uneasiness felt in the lumbar region, he was cupped to twelve ounces. As the urinary sediment presented only these pus-cells and membranous orange-coloured flakes and fields of cohering corpuscles, an examination was made to ascertain if the patient suffered either gleet or stricture, bnt he was quite free from these complaints.

On the 28th of January, with pus-cells, both free and coherent, were again seen two or three exceedingly delicate and transparent ribbon-like films; they were distinctly flattened; a few bright nuclei were seen attached. Some large spherical cells, granular, or with a single nucleus, were also present.

On February the 4th, in addition to the groups of exudation or pus-corpuscles, several flakes of fibrine, stained of a bright orange red, together with some large granular cells, were also noted. (Pl. VIII, fig. 13.)

From February 8th to the 15th, and even to the middle of March, the urinary sediment underwent but little change. (See fig. 14.)

On the 21st of January he was ordered the sesquichloride of iron. The anasarca had disappeared everywhere except in the right ankle. But little alteration took place in the amount of albumen or in the microscopic condition of the urine till the 23rd of February, when a considerable diminution in the apparent amount of albumen was noticed. He had continued the sesquichloride with the cream of tartar purgative occasionally. In the beginning of March the troublesome frequency of micturition began to abate; all the functions, but that of the kidneys, were regular, and but for the albumen in the urine and the sediment, he might have been pronounced convalescent. He was at this time, March 17th, ordered the gallic acid in place of the sesquichloride.

In a few days micturition became less frequent, and the anasarca of the ankles disappeared, and the proportion of albumen became palpably less, and a change took place in the urinary sediment. Up to this period pus-cells, cohering so as to form flakes visible to the eye, isolated pus-cells, and fields of vesical epithelium, with here and there some orange-stained granular coagula, were the objects seen by the aid of the microscope. There now became apparent, in addition to the vesical pavement-epithelium, many of the oval epithelial cells from the pelvis and calyces of the kidneys, which are much less in size than the vesical epithelial cells, and have always more or less of a well-defined oval shape. (Fig. 14.) There were also seen some of the smaller and more quadrangular epithelial cells from the straight uriniferous tubes. But no tube-casts could be found. In an examination of the urine made on the 23rd of March, the cells, which had hitherto with acetic acid displayed their compound trefoil-looking nucleus, now exhibited a single nucleus, or assumed more the appearance of cells filled with granular matter; in fact, they lost the chief characteristics of the pus- or exudation-corpuscle, and began to assume more the character of what some would call the simple mucous corpuscle. In fact, the cells seemed to be losing their purulent character and returning to that of the aborted or defective epithelial cell. Many epithelial cells from the calyces and pelvis were also seen. They were easily recognised by their oval shape and being half the size of the pavement vesical epithelium. Some large compound granule-cells were also present.

The membranous flakes, stained of a bright orange colour from the hæmatin of the blood, had quite disappeared, and a careful examination of many samples of urine on the 23rd and 24th of March failed to detect any. Could their absence and the altered character of the sediment be in any way traced to the action of the gallic acid? These amorphous orange-coloured flocculent shreds, associated with pus-cells, detached or aggregated into groups, have, I believe, a very significant meaning, and afford the means of detecting a form of disease in the renal structures not hitherto sufficiently distinguished.

Acetic acid exercises no influence on these flocculent shreds stained with hæmatin. These amorphous fibrinous shreds, of a deep orange-red colour, accompanying pus-cells and exudation-corpuscles, are seen in the form of inflammation of mucous membranes known as the croupous. They are present in the diphtheritic sore throat. I have seen them in abundance in the sputa of a mild case of pneumonia. In severe cases they are marked by the red, rusty colour of the sputa. I have seen them also in the dejections of a dysenteric patient—in that stage in which the mucous surface is the seat of a membranous exudation.

I am inclined to think that the appearance of these membranous shreds stained with hæmatin, when associated with pus- and exudation-corpuscles in the urine, may be accepted as evidence of a form of inflammation in the renal tubes, as well as in the straight tubes of Bellini, and probably affecting also the mucous membrane of the calyces, which is strictly allied to, if not identical with, the croupous. This inflammatory process is certainly different in its effects from that which takes place in those cases of albuminous urine where tube-casts are present.

General anasarca and highly albuminous urine are present in both forms; but in this, now under consideration, the inflammatory engorgement leads to an exudation of a pseudo-membranous deposit, in which pus-cells and exudation-corpuscles are ultimately generated, and with membranous débris stained with hæmatin are thrown off from the tubes and washed away by the urinary stream. The sediment in these cases presents appearances microscopically similar to what are seen in the exudative products of ordinary diphtheritic inflammation of the throat, or of inflammatory croup in children. An appeal to post-mortem results is necessary to place the question beyond the limits of conjecture. These cases, however, do not usually terminate fatally at this stage. By reference to the plates it will be seen that these amorphous flakes stained with hæmatin are present in most of the hæmorrhagic conditions of the kidney. They are seen also in the sediment in cases of calculous and tubercular pyelitis, associated with pus-cells.

It might appear, therefore, that their significance was but trifling, and that no special value could be placed on what was common to several apparently different states of the kidney. A closer examination into the several conditions which cause their appearance will, I think, remove these doubts. In hæmorrhagic stages of the kidney the microscopic appearances are sufficiently expressive.

Tube-casts, with blood-discs and epithelial cells, characterise the early stage of morbus Brightii, and those membranous coagula result from the coagulation of the fibrine in amorphous masses. In calculous pyelitis, in addition to the pus-corpuscles, flakes of lymph are thrown off stained of this orange-red colour. In tubercular pyelitis and nephritis they also arise from effused lymph thrown off from ulcerating surfaces in the cavity of the kidney. It must be recollected that in these forms of renal disease the urine is distinctly purulent, depositing when at rest a marked precipitate of yellow cream-like corpuscles. The patient, however, has no dropsical symptoms; and the urine has none of the usual characters of this excretion in morbus Brightii or albuminuria. But in the class of cases under consideration the symptoms of the patient are those of renal dropsy, and the character of the urine is that which is usually seen in morbus Brightii, except that no tube-casts are ordinarily found in the sediment: this is the exceptional condition—the sediment is a flocculent cloud, in which membranous-looking shreds are visible to the unaided eye. These are seen to consist of aggregation of pus-cells, held together in a flaky form; many pus-cells are isolated and free, and mixed with them are those amorphous fibrinous masses stained with hæmatin. This state of the urine is, I think, significant of an inflammatory process different from that which is going on when tube-casts are present; it is allied to the croupous form of inflammation of other portions of mucous membrane. Eventually it may lead to fatal disorganization. But the renal dropsy in these cases are more tractable, and more easily subdued, and the conditions of the patient are more hopeful. The renal disorder, although obstinate, ultimately yields to treatment; and with care, a return of the disease may be avoided, and we may fairly calculate that dropsy and albuminous urine, with this kind of sediment, does not present the same threatening and unfavorable prognosis which albuminous urine with tube-casts generally suggests.

The constitution of this patient continued to improve, and he left the hospital on the 30th of March. There was no anasarca when he left, and his general health and bodily vigour he declared to be as good as ever. But the urine was nevertheless albuminous, and the flocculent sediment consisted of isolated cells, but the greater part had but a single nucleus; only here and there one with a trefoiled nucleus and retaining the character of the ordinary pus-cell. A greater abundance of oval epithelial cells, such as belong to the calyces and pelvis of the kidney, was noticed. No tube-casts could be found, and the fibrinous flakes stained with hæmatin had quite disappeared. He left the hospital free from all symptoms of dropsy, but the urine was slightly albuminous, and deposited a faint cloud composed of isolated epithelial cells. (Plate VIII, fig. 15.)

## SUPPURATIVE OR NON-TUBULAR FORM OF MORBUS BRIGHTII.

Before the late lamented Dr. Bright had given a place in pathology to certain forms of renal disease associated with dropsy, the form of disease to which I am desirous of directing attention would have been considered as nephritis, and no distinction or correct diagnosis would have been made between this and the suppurative diseases of the kidney arising from calculus or tubercle. The presence of dropsy would have particularised the case, but this symptom, in all probability, would have been considered accidental or exceptional, certainly not pathognomonic. But the impulse given by that distinguished physician to the study of renal diseases has enabled the physician, even during life, to distinguish now, without difficulty, the several causes which lead to the production of purulent and albuminous urine. Nevertheless, purulent urine in connexion with renal dropsy and morbus Brightii is a rare condition. For the most part—that is to say, in almost every case of Bright's disease—the urine is albuminous, with a very scanty, and often to the naked eye inappreciable, sediment, consisting of tube-casts, and cells thrown off in the progress of the disease from the remoter parts of the organ. In the tube-casts not unfrequently may be seen, mixed with other degraded forms of epithelium, cells having the character of the pus-cell, with a trefoiled or reniform nucleus. In the acuter forms of the disease, these cells are the most numerous; but they are always brought away with the tube-casts, and are contained within them. But in the case to the characteristics of which I now desire to refer, the urine was as distinctly purulent, and threw down, when at rest, a deposit as abundant as occurs in calculous pyelitis, or in tubercle of the kidney. The urine, when passed, was opaque and milky; but, allowed to rest, it soon separated into an upper clear, amber-coloured urine, and a lower stratum, occupying nearly one-sixth of the whole glass, of a yellowish, creamy colour and consistence, perfectly fluid, but converted by a little liquor potassæ into a ropy, viscid magma; and exhibiting under the microscope all the usual characters of the pus-cell. The clear portion of the urine was albuminous, but frequent examinations failed to detect in it any trace of tube-casts. A few large exudation-corpuscles, and pus-cells which had not gravitated with the rest, were alone visible. Now, these conditions of the urine are common to suppurative diseases of the kidney. But this man was dropsical: his history and symptoms were those of renal dropsy; but suppurative conditions of the kidney are rare in morbus Brightii. Yet they have been recorded, and this case must be classed with those which may be designated as the suppurative and non-tubular form of Bright's disease. The sequel will explain the pathology of this variety of the disorder.

Case XXIX.—Wm. S—, aged twenty-four, a marble-polisher, was admitted December 21st, 1858, into King William Ward. The face had a doughy and blanched look; the feet and ankles were œdematous, and pitted on pressure. The face was somewhat swollen, and he stated that on awaking in the morning, he had some difficulty in opening his eyes, owing to the swollen state of the lids. Micturition was frequent, and troublesome at night; the urine was abundant in quantity, pale colour, specific gravity 1·012, and highly albuminous. The skin was natural in temperature. The tongue was clean, but there was anorexia and thirst. The pulse was 80, moderate in fulness; and the heart's sounds were natural, but there was troublesome cough, and some dyspnœa. The chest was well formed, resonance equal; moist catarrhal sounds were heard in all the large tubes; the expectoration was catarrhal mucus. The patient stated that a few weeks since, after getting wet through, he suffered from rigors, with pains in his head, back, and loins, and great irritability of the stomach, amounting to vomiting. He noticed that his face was swollen in the morning, and that soon after, his feet and ankles became œdematous. He recollected suffering a similar attack about two years since, which commenced with rigors and vomiting, and frequency of micturition. He cannot recollect whether he ever passed blood. The urine was more carefully examined the day after his admission: it was then found that it was opaque when passed, scarcely milky, but cloudy and not clear. When allowed to rest in a tall glass, it soon became clear by the separation of a sediment which occupied about one-eighth of the glass, and which left the superstratum of urine of a pale yellow colour. The sediment possessed all the characteristics of pus, and the action of liquor potassæ upon a portion, and a microscopic examination of the remainder, proved the presence of pus. For five successive days a minute examination of the urine was made with the microscope, and no tube structures could be detected. Cream-of-tartar purgatives, with jalap, freely acted, and the dropsy gradually abated, and with it the cough and dyspnœa disappeared, and the general condition of the patient materially improved. But no change took place in the purulent character of the urine. He continued to progress favorably; was able to take animal food, which, with the aid of the sesquichloride of iron in very small doses, gave prospects of a recession of the grave symptoms of renal dropsy. He continued for more than a fortnight exhibiting this condition of promise, when, either from having gone out for a few hours, or from some unexplained cause, the urine suddenly decreased in quantity, with a rapid development of general anasarca. The morning after this relapse—January 15th—he suffered from an epileptiform attack, consisting of convulsive movements of the face, with spasmodic movements of the extremities, followed by rigidity of short duration. There was a return to consciousness in a few minutes. The urine passed this day did not exceed three ounces, and the following day there was complete ischuria; a catheter was passed, but scarce a drop of urine flowed. Croton oil purgatives were administered with prompt relief; copious watery dejections, relieving a tendency to stupor, which had become apparent as the day advanced.

The next day, January 16th, he had a succession of fits, of a few moments' duration each: the surface of the body emitted a remarkable and strong urinous odour. There was a tendency to stupor, a torpor from which he could be roused for a few minutes. He was ordered the chlorine mixture every two hours, and after the fourth dose some improvement seemed evident. The urine was passed in increased quantity, as much as four ounces at a time, in intervals of four and five hours.

During the night of the 18th, he suffered two more convulsive attacks. The tongue was brown and dry. He was conscious, but speech was imperfect. The breathing was laboured, and in the course of the day became stertorous. A gradually increasing coma followed. The pupils became dilated. Both urine and fæces passed involuntarily. The last sample of urine collected was more highly albuminous than any previously examined, and it contained a larger proportion of pus. No further convulsive movements were observed; the respirations became slower and more laboured; and in this state of deep coma he lay for more than thirty hours, and died on the 20th.

*Post-mortem examination of the kidneys.*—It was with great difficulty that the kidneys were obtained for examination.

No other region of the body was examined. There was a remarkable difference in the size of the two kidneys. The left weighed four ounces and a half; the right only one ounce and a half. This difference, however, arose not from disease, not from an atrophied or wasted state of the organ, but simply from arrested development, and was evidently congenital; for the smaller kidney was perfect in all its parts, and in respect of diseased appearances was a counterpart of the other. The external aspect of each was the same, differing only in size. They were both irregular and lobulated on the surface. The capsule was non-adherent, and was detached with the most perfect ease. The cortical surface thus displayed was of a madder-red colour, but speckled with numerous groups of granules, of a yellowish colour; here and there one of larger size appeared isolated, and gave the appearance of a tubercle rising something above the cortex. A section of both kidneys exhibited similar conditions. The deposit appeared more diffused, and less aggregated into groups; it had made considerable inroad on the mammary cones, and at several points the exudation had undergone purulent softening, and a true yellow pus was readily pressed out from these points. The deposit which appeared in the cortical part, as well as that which surrounded and dipped in between the pyramids, presented the usual appearance of the exudation in acute morbus Brightii, differing only in this, that usually the exudation is uniformly diffused in Bright's disease, while here, as regards the cortex, it was irregularly distributed. The mucous membrane of the calyces and pelvis was marked with fine arborescent vessels, and from the apex of the cones in both kidneys could be pressed a yellow fluid, which, examined by the microscope, presented similar appearances to those observed in the urine during life.

The microscopic examination of these kidneys was full of interest. In the greater part of the white deposit in the cortical part, as well as at the base of the cones, all trace of tube structure was lost, and only abortive cells and fine, resplendent granules (disintegrated nuclei) were seen. The latter were quickly removed by ether. Selecting those portions of the deposit which seemed merging into the parts free from disease, the convoluted structure was easily traced, but no true epithelial cell could be seen. Large compound granule-cells, with numerous nuclei, many aggregate nuclei in grape-like clusters, and a great abundance of highly resplendent granules (isolated nuclei), filled the field. Continuing the examination, what appeared to be a Malpighian body filled with pus-cells was observed. The cells had either a reniform or trefoiled nucleus; and in each of those parts of both kidneys which were undergoing purulent softening, the starting-point seemed to be the Malpighian bodies; for by using a moderate magnifying power, a minute speck of soft yellow matter was seen, which slight pressure caused to escape, and to leave a minute cavity.* The convoluted tubes in the neighbourhood of one of those purulent spots were filled with pus-cells. The straight tubes of the cones towards the base, and in contiguity to a spot of deposit, were also seen filled with pus-cells; the epithelium of the wall of the tube presenting the usual appearance. Drawings were made and preserved of these several parts. The fluid pressed out from the apex of one of the cones consisted of epithelium, forced out by the pressure, mixed with pus-cells. One or more large pus-casts were seen as if they had been impacted in one of the tubes, and only forced out by the direct mechanical effort of compression. There could be no doubt that the purulent conditions here and elsewhere observed in these kidneys arose from the ordinary process of purulent liquefaction or softening to which inflammatory products are peculiarly susceptible, but which the exudation in Bright's disease rarely undergoes, or so partially, and to so trifling an extent, as either to escape notice, or be seen only in the form of here and there a pus-cell mixed up with the granular deposit thrown off from the kidneys during life. For the *post-mortem* examination of the kidneys in the acute form of this disease rarely exhibits any other appearance than a diffuse exudation infiltrating both the interstitial and tubular portions of the organ. The liquefaction and conversion into pus of any portion of this exudative product, to an extent sufficient to impregnate the urine with a strongly marked purulent sediment, is sufficiently rare to raise this case into importance, and materially to aid our pathological inquiries into the nature of the deposit in some forms of morbus Brightii. It has already been observed that the presence of an abundant deposit of pus in the urine suggests one of the following forms of disease of the kidney: simple purulent nephritis; scrofulous, calculous, or gouty pyelitis; or tubercle of the kidney. But in neither of these is dropsy an accompanying symptom. Moreover, if death follow, it is usually from exhaustion or asthenia, rarely with symptoms referable to the poisonous agency of urea on the nervous centres. The peculiar pathognomonic conditions during life in the disorder designated as morbus Brightii are expressed by symptoms which are absent in the renal disorders just enumerated—namely, general dropsy, and a fatal termination by uræmic poisoning. These were the prominent symptoms of this case, and afforded a clear, intelligible diagnosis during life. But the urine presented exceptional conditions, not commonly observed in morbus Brightii. The sediment usually consists of various matters moulded in the uriniferous tubes, and preserving more or less of a tubular or cylindrical arrangement. When examined by the microscope, if a few pus-cells are visible, they are the exception. In Plate V, fig. 2, is represented a few pus-cells at the extremity of one of the tube-casts in a case of renal dropsy, which terminated favorably.

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* Dr. G. Johnson mentions a similar case, q. v. See also Robert on 'Urinary Diseases,' page 92.

Case XXVIII, p. 238, was a case of dropsy without tube-casts, but with albuminous urine containing pus-cells; that case terminated favorably. There, however, the proportion of pus-cells was so small that the microscope alone detected them.

It is not necessary to cite further examples to prove that pus-cells are frequently found in the urine in renal dropsy, and are evidently the product of an inflammatory process, established in the kidney. Yet this purulent transformation of the morbid products in morbus Brightii is usually of such limited extent as to become an insignificant or unobserved object; and when, as in the present case, the amount of pus deposit forces itself on the attention, the physician would at first be inclined to refer its source to any other origin than the exudation constituting the essence of this form of Bright's disease. The symptoms during life were, however, so strongly pronounced that no hesitation or doubt hung over the diagnosis; and, at the first examination of the patient, his case was declared to be that form of renal dropsy where the exudation undergoes purulent metamorphosis. It was at the same time remarked, that if this purulent change was taking place only in the inflammatory products contained *within* the tubular structure, there was no reason why recovery should not ultimately take place; for if the pus was derived from the convoluted tubes only, however remote, and if the interstitial portions of the kidney were not involved, there was nothing incompatible with ultimate recovery, any more than is known to occur in cases of pneumonia, where the inflammatory product, thrown out into the air cells and minute tubes leading thereto, constantly liquefies and becomes converted into pus, a slow and gradual return to healthy function following the excretion of the purulent secretion. Thus in pneumonia, so long as the disease is vesicular and intratubular, recovery constantly recovers; for there is no destruction of tissue as must happen if the disease were interstitial also. So in these forms of morbus Brightii, if the exudation—as happens in curable cases—be limited to the convoluted tubes, and the interstitial structures, as in pneumonia, be not involved, the morbid product suffers ulterior changes which facilitate its escape, and the organ may, and does eventually, recover. But it is clear that in both forms of disease, pulmonary as well as renal, if the interstitial structures are implicated, one of two consequences must follow: either the capillary circulation becomes impeded and destroyed by the pressure of the interstitial products, its vessels obliterated, and the function of the part effectually annulled; or the exudation becomes transformed into pus, with destruction of tissue and suppuration of surrounding parts. Both of these morbid phenomena occur in the pulmonary tissue; one common, the other rare. Both are also occasionally seen to occur in the kidneys. In these organs the former condition is by far the most common. The exudation is both tubular and interstitial; it is little subject to ulterior change; it slowly accumulates, enlarges the organ, impedes and obliterates the capillary circulation, and ultimately destroys life by uræmia; and is exemplified in the large, flabby, exsanguineous kidney so constantly seen after death from renal dropsy. But the second condition, although unfrequent, occasionally shows itself in the kidneys. It is a rare form in the lungs; it is equally rare in the kidneys. Rokitansky has a very good account of interstitial pneumonia.

The *post-mortem* conditions of the kidneys in this case were valuable examples of this interstitial deposit suffering purulent metamorphosis. Minute purulent surfaces, scattered through both kidneys, readily yielding a speck of yellow pus upon pressure, and leaving a little cavity, easily visible by an ordinary magnifying glass, was the evidence on which this opinion rested, and confirmed by a more minute investigation by the microscope.

Idiopathic nephritis—that is, simple uncomplicated inflammation of the kidney—is, with our present knowledge, a doubtful form of disease. I have only known it as arising from mechanical injury. The urine in such cases is both purulent and bloody: the one often alternating with the other. The source of the pus is principally from the mucous surfaces of the calyces and pelvis, and occasionally from the tubular structures; but all parts are involved. Moreover, there is no dropsy. Scrofulous and calculous pyelitis and nephritis have their special character, which are fully detailed in a subsequent chapter.

In tubercle of the kidney, the urine is permanently purulent; but here also no dropsy is ever present, and the patient succumbs to the exhaustion consequent on the purulent drain.

The morbid appearances of tubercle of the kidney are sufficiently characteristic. The mucous surface of the pelvis, the cup-shaped calyces, even the apices of the cones, as well as the substance of the kidney, are the seat of ulceration and abscess.

We may, therefore, consider that when the symptoms of renal dropsy are associated with a purulent non-tubular sediment in the urine, in proportion to the amount of that purulent sediment will be the probability that the interstitial structures of the kidney are the source of the pus; and that, as this condition is consequent upon the destruction of the renal parenchyma, the prognosis must necessarily be unfavorable. On the other hand, if the amount of pus be inappreciable, visible or cognisable only by the microscope, even though tube-casts be not present, it may be assumed that the purulent change is confined to the exudation contained within the tubes, and that this exudation not necessarily implicating every part of the kidney, but, as in pneumonia, being of limited extent, a recovery, under appropriate treatment, will follow, and the kidneys, like the lungs, eventually return to their natural and healthy function.

The following case further illustrates the form of renal disease in which the pus-casts occur.

They appear to have been formed principally out of the epithelial elements of the larger or straighter tubes of Bellini.

Case XXX.—A woman came under my care in Hallett Ward, in February, 1862, suffering from general dropsy, anasarca of the face, trunk, and extremities, dyspnœa from pulmonary œdema and cough. There was great irritability of the stomach. The urine was pale, of moderate abundance, sp. gr. 1·008, highly albuminous, but which eventually became scanty and almost suppressed, followed by symptoms of uræmic poisoning, and who died three days after admission. The urinary sediment under the microscope exhibited these so-called pus-cells, in groups, with here and there some aggregated together in a tubular form, the pus-casts. Pl. IV, fig. 11. The kidneys, when examined, were about the average weight, their surface studded with aborescent vessels. The capsule tore off easily, and displayed the cortical surface slightly granular—sabulous. A section showed the cortical margin all but gone; the base of the cones being spread out, and as if lost in the margin. The colour was paler than in health, but had not the salmon hue of one form of Bright's kidney. The fluid pressed out of the apex of the pyramids when examined by the microscope displayed the same appearance as was seen in the sediment of the urine during life, namely groups of bi- and tri-nuclear cells, and some arranged in a cylindrical or tubular form. The tubes of the pyramids when teased out, as well as those of the base of the pyramids, exhibited their interior filled with similar cells, and some granular matter. It is thus apparent that these cells are formed at the expense of the renal epithelial cells, probably of the large straight tubes, whose place they occupy, for no true epithelium was visible in tubes in which they were present.

# PART II.

## DROPSY IN CONNECTION WITH DISEASES OF THE LUNGS AND HEART—KIDNEYS SECONDARILY AFFECTED.

## DROPSY IN CONNECTION WITH DISEASE OF THE LIVER—KIDNEYS NOT NECESSARILY IMPLICATED.

# PART II.

## I. DROPSY CONNECTED WITH DISEASE OF THE HEART OR LUNGS —KIDNEYS SECONDARILY AFFECTED.

## II. DROPSY—FROM DISEASE OF THE LIVER—KIDNEYS NOT NECESSARILY IMPLICATED.

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## CHAPTER I.

### ON CARDIAC AND PULMONARY DROPSY.

DROPSY is significant of two forms of disease of the heart. In one, the affection of the heart is viewed as the primary cause of the dropsy. In the other, the condition of the heart is secondary or subsidiary to certain states of the lungs.

It is to these two forms of heart disease connected with dropsy that I desire now to direct attention.

In the first of these, the disease originates in the heart; the left heart, more particularly its valves. In the second, the heart becomes implicated as a sequel to disease in other organs, more particularly the lungs, with evidence of defective nutrition in itself. In the first case, therefore, the heart is the primary source of the symptoms; in the second, it is only subordinate or intermediate thereto.

As a preface to the subject of cardiac dropsy, I will describe, by way of contrast, two typical cases of this form of disease; the one arising from mitral regurgitant and aortic obstructive disease; the other originating in emphysema and chronic bronchitis, and manifesting changes in the right heart, in the shape of dilatation and attenuation of its walls.

A young person, about the age of puberty, has suffered from symptoms of acute rheumatic fever; the cardiac complications may have been pericarditis, or disorganization of the mitral and aortic valves. The convalescence from the fever is slow, and probably marked by shortness of breath and great palpitations on the slightest bodily effort; a few weeks pass; some ill-defined disturbing cause occurs; the respirations become more deeply affected; and soon the feet and ankles begin to swell. There is a remarkable alabaster whiteness of the skin. The dropsy rises higher and higher; the cutaneous surface glistens from over distension. The heart's action becomes more and more embarrassed and tumultuous; the lungs become gorged. There is a frequent short and distressing cough. The sputa are frothy and blood-stained; the breath is cold. The impulse of the heart to the hand is undulatory, and a confused systolic murmur is heard; fine moist crepitating sounds are heard all over the chest, and more particularly at the base of both lungs. The eye-balls are protruding. The alæ nasi are distended, and rise and fall during the hurried and laboured respiration. The youthful countenance has an anxious and remarkable expression, given by the glistening sclerotic. The tongue is red and moist; purplish perhaps, but clean, or moist and clammy. The urine is scanty, but free from albumen. The abdominal cavity is also free from fluid; or, perhaps slowly, signs of its presence may come on from imperfect circulation through the liver. The respirations become more frequent, more laboured, more distressing. The tubes of the air-passages fill with frothy sputa from the gorged lungs, and soon the scene closes, and death by apnœa terminates the sufferings of the youthful patient.

Such is the significant picture of dropsy from disease of the left heart—essentially cardiac dropsy.

Let me ask attention to the characteristics of the other forms of dropsy, where the heart becomes secondarily affected.

A person of the middle period of life has long been subjected to chronic cough and occasional attacks of dyspnœa, with more or less abundant expectoration.

The health begins to fail; to break as the people say. The feet begin to swell, and bodily activity gradually becomes more and more limited. The dropsical effusion increases and extends. The cough and shortness of breath become more distressing. There are frequent, even daily attacks of a spasmodic gasping for breath, and the inspiratory movement of the chest is reduced to the minimum limit.

The countenance wears a dull, leaden expression; the face becomes dusky; the eyes inexpressive, hazy and misty in their character. The lips are bluish; the tongue cold, clammy, and of a livid hue. The breath comes to the hand reduced in temperature. The upper and lower extremities become more and more anasarcous; and the feet and hands are bluish and mottled. A distressing tension of the cuticle, even to bursting, marks also the extent of the infiltration of the connective tissue of the extremities, and in colour and temperature they may assimilate the appearance of mortification.

The abdomen may afford, by fluctuation, signs of the presence of fluid; and the urine, scanty and high coloured, may begin to exhibit traces of albumen.

The patient is propped up in bed, bent foward; the shoulders rounded, so that the head may be bowed between the knees.

An exalted resonance characterises the percussion sound of the chest behind; no ordinary respiratory sound can be heard; a moist or coarse mucous murmur, with wheezing and cooing sounds are heard everywhere.

The heart affords the feeblest impulse; perhaps none can be felt; the first and second sounds are distinct; perhaps sharper than natural. There is a remarkable pulsation observed in the veins of the neck.

The patient dozes rather than sleeps; takes food scantily; for either there is no desire for it, or so much flatulence is produced, that a dread of the increased oppression to the breathing which follows, increases the aversion to it.

Such are the most distinctive features of that form of cardiac dropsy which arises from passive dilatation of the right heart;

this organ, however, being secondarily, and not primarily affected, as in the first-named typical case.

The first of these disorders has reference to the valvular structures of the left side of the heart.

The second relates chiefly to the state of the walls, and the capacity of the cavities of the right side.

Moreover, as further points of distinction, the first is traceable, for the most part, to antecedent acute rheumatic inflammation, when the endocardium, the valves of the left cavity, or the pericardium, have been the seat of rheumatic disturbance, while the second has its origin in pulmonary disorder of long duration.

Disorganization of the valves of the left side of the heart is a well-known concomitant of acute rheumatism; yet it is not a little remarkable, and must be familiar to most physicians, how few suffer from dropsy, of those whose mitral valves only have become disordered; and in whom a mitral murmur is easily detected. How many patients we meet with who for years have thus suffered from an imperfect mitral valve, who enjoy a fair share of health, and who, except that they are not equal to any rapid bodily effort, such as running, or being hurried in their movements, go through a life of average duration without other inconvenience.

This exemption from the serious evils which follow a like form of disease in others, is partly due, perhaps to the extent of the disorganization of the mitral valve, which will, of course, regulate the amount of pulmonary disturbance that will follow; but partly, and I believe chiefly, to the character of the succeeding changes which may occur in the morbid deposit leading to the disorganization of the valves.

The degree and extent of the deposit, whatever its character, must of course be the measure of the pulmonary disturbance, so that when the mitral valve is simply thickened, or its margin irregular, permitting a moderate amount of regurgitation, there will be a very different degree of pulmonary embarrassment, as compared with those cases in which both mitral and aortic valves are implicated, and where there is both aortic obstruction, as well as aortic and mitral regurgitant disorder; but it is chiefly to the special pathological character and resulting changes which take place in the deposit, that we must look for an explanation of the comparative immunity of some patients from serious and fatal consequences, and the fatality attending the disorder in others.

Hitherto it has been conceived that these deposits on the valves are derived directly as an exudation from the blood; in fact, a transudation, a filtrate of fibrine (from the hyperinotic blood) through the walls of the capillary vessels, and a simple permeation through the serous coat of the endocardium, and a deposit as coagulated fibrine on the surface of the valves. But I think Virchow ('Cellular Pathology,' p. 363) has conclusively shown that there is no exudation in the sense formerly conceived; but that the cellular elements of the endocardial membrane take up a greater quantity of material, and the spot becomes swollen, and eventually rugged excrescences, or condyloma arise, and the integrity of the valve is destroyed.

Now, this deposit always exhibits a fibriform character when examined with the microscope:—if recent, it displays appearances somewhat dissimilar to freshly coagulated fibrine, wavy or sinous lines interlacing each other with more or less granular matter entangled in the meshes.

This deposit appears to suffer, or to develop within itself, different results. In some cases the morbid process seems to run a very rapid and tumultuous course; the fibriform deposit softens and crumbles down, drops off the valves to which it has been but loosely attached, is carried into the circulation. and those embolic deposits in remote and distant organs are produced with which we are now familiar; results made known to us, however, by Virchow, and subsequently by Dr. Kirkes, about the same time as by the former.

But there are two other resulting changes which these deposits undergo, and which are more particularly connected with the subject before me.

First there is established a subordinate metamorphosis of the material deposited, a slow and continuous calcifying change takes place apparently in certain central or dissevered points, and inorganic elements first in small, and eventually in larger quantities, can be chemically demonstrated. The inorganic material is always carbonate and phosphate of lime, in the same relative proportion as they are found in bone. There can frequently be demonstrated an obscure disposition to a stellar form of arrangement in the inorganic deposit, analogous to the stellate-cells of bone, which I conceive can only be effected through the agency of cells. This change in the character of the deposit has appropriately enough been termed the calcifying process. (Plate XV, figs. 1 and 2.) It is a degree less than the process of ossification. Calcification appears to be to these cardiac and valvular deposits what cretification is to tubercle. The term cretification is inappropriate, for the earthy matter, the conservative metamorphosis of pulmonary tubercle, is not chalk, but carbonate and phosphate of lime in similar proportion to what exists in bone; and is, therefore, a strictly analogous process to that of calcification of cardiac and arterial tissue.

To return to the subordinate metamorphosis which takes place in these endocardial deposits.

The granular material, of which the deposit appears originally composed presents a certain wavy undulatory arrangement of the accompanying fibres, and gradually takes up earthy material at isolated points; these seem incapable of further change, except that which relates to extent and quantity.

It is this calcifying process which renders the deposit incapable of further change, and is assumed to exist in the valves of those who carry through life a systolic mitral murmur, and whose health does not materially suffer from its presence. It has occurred to me within the last five years to make a post-mortem examination of two persons who died from fever, who were known to have suffered severally, the one for eight, the other for twelve years, from a well-pronounced mitral murmur. In both of these the margin of the mitral valve was opaque, and presented the character of a rigid ring, and cut with a grating sound; the left ventricle was hypertrophic. In both of these the earthy deposit existed, as shown in Plate XV, figs. 1 and 2; and its chemical constitution was verified by analysis. I assume, then, that this is the condition which ensures comparative safety to the patient from the ulterior effects of a disorganized valve; and explains, I think satisfactorily, the reason of this immunity.

There is one condition which must not be overlooked, and which may exercise a commanding influence over these favorable results: the body continues well nourished, and cell-development we may believe continues vigorous, healthy, and active.

The thickening of the valves in these cases originally arises from an excess of a fine granular matter, usually considered as arising from an inflammatory process, which is deposited in the texture of the valve.

It is really a thickening of the structural elements of the endocardial membrane which appears to take up this granular product and retains it; and it is in this granular matter that minute traces of earthy matter may be traced. Microscopically, the tissue appears composed of wavy sinuous lines, with a very granular aspect, studded here and there with patches of a dark, almost black colour, which arises from light not being transmitted through them; by reflected light they appear white. The dark spots are quickly removed by digestion in dilute hydrochloric acid, and the solution yields to analysis proofs of the presence of carbonate and phosphate of lime.

This then, is the form of valvular disorder which remains so comparatively inert, or which at any rate, exhibits no disposition to be followed by dropsical symptoms.

The most frequent result is hypertrophy, or increased nutrition of the walls of the left ventricle, with the probable consequences of that complication. It is rarely, I believe never, the starting-point of cardiac dropsy.

The significance, then, of this process of calcification of the valve is not dropsy. Its morbid results and sequel are, for the most part in an opposite direction. It may be, and most frequently is, followed by apoplexy; and I think we may here find an explanation of that pathological view which brings apoplexy in direct relation to hypertrophy of the heart. They have been placed in the position of cause and effect. The cerebral hæmorrhage in apoplexy has been made to depend directly on the increased driving power of a strong and hypertrophic ventricle. But that which laid the foundation for the increased nutrition and strength of its walls, the morbid deposit forming the organic defect in the valve, becomes the immediate cause of the apoplexy.

That which most usually originates hypertrophy of the left heart, is either an imperfection of the valvular apparatus of this side, or a slowly increasing rigidity, and defective elasticity of the aortic sinus caused by deposits of an opaque material, commonly called atheroma. (Plate XV, fig. 1.) In cases of hypertrophy of the heart from these causes, this pathological product is not confined to the endocardial or aortic tissues; but slowly extends through the arterial system generally, and is either more abundantly deposited in the cerebral arteries, or their elasticity is more fatally destroyed. (Plate XV, fig. 3.)

The brittleness or loss of elasticity in process of time arrives at that point that, under excitement of some disturbing cause, emotional or physical, the vessels, unequal to the increased pressure of blood from a powerful driving force on one side, and the impediment to the escape of blood through the great venous outlets, which is produced by the constriction the jugulars suffer by the muscles of the neck, whether from emotional or physical causes, give way, and hæmorrhage into the cerebral substance or apoplexy follows.

I have already pointed out the disposition which is apparent in this process of calcification, for the earthy matter—obscurely in some cases, but, in cases of the so-called ossification of arteries, more pointedly, to assume the stellate form of arrangement, such as is apparent in ordinary osseous structures. I cannot conceive that this disposition to such a symmetrical grouping of the earthy matter can result from mere molecular attraction; but I believe it to be regulated by the organic or cellular elements in which the process is taking place.

I shall presently have occasion to refer more particularly to the agency of the cellular elements of these textures, after I have noticed the other form of subsidiary change and metamorphoses which these deposits suffer, and which becomes significant of the dropsy which follows. This, sad to say, is by far the most frequent sequel to these valvular disorders.

As in the calcifying process, so in this, the changes are slow, insidious, and but for some attending symptoms to be noticed hereafter, only indirectly to be predicted during life.

This process is essentially a fatty degeneration of the morbid deposit. Not only are large and highly refractive granules of fat generated throughout the deposit; but these evidences of degeneration are further accompanied by beautiful plates of cholesterine, most significantly conveying to us indisputable proof that the elements of this change are essentially fatty, and consequently a degenerative process. (Plate XV, figs. 4 and 5.)

Here are two results of a fibrinous exudation to be considered, the one earthy, the other fatty. I will venture to ask, through what agency are these changes brought about? Are we to be satisfied with the statement, that some exudations undergo one change, others another?

If a fibrinous exudation undergoes liquefaction, and pus is formed, we do not hesitate to acknowledge that this change is brought about by the metamorphosis of its cellular elements.

If we take a fatty liver, the seat of fatty or amyloid degeneration, we can demonstrate that the fatty and amylaceous material is accumulated within the imperfect liver-cell.

If we examine a waxy kidney, one expressive of the highest degree of degeneration, we see that the cellular elements are highly charged with fat, and that what we see accumulated in the convoluted tubes, or deposited in the intertubular spaces, has been brought there through the agency of imperfect cell-development.

May we not then conclude that in these cardiac exudations, the exudation contains cellular elements, as yet but obscurely demonstrated, which are prone to take up earthy matter in one case, or to undergo fatty metamorphosis in the other?

In other words, that the cellular elements of the spurious tissue, never reaching the elective force of true development, nevertheless, in one direction, indicate a conservative force, by the selection of the elements to form bone, which in some rare cases is partially reached, as in ossification of arteries, where not only a maximum amount of earthy matter is taken up, but where stellate cells are formed; and although this is not true bone, yet it indicates the disposition of the structural elements to work in the physiological rather than in the pathological direction.

Plate XV, figs. 1 and 2, represents spots of calcification, indicating a disposition to a stellate form of deposit of the earthy material.

On the other hand, there is the direction of an opposite type, where the tendency is to pass downward, in the course of fatty decay. The cells are abortive, their nuclei are fatty; they soon disintegrate and perish, and they leave in the surrounding texture evidence of the extent to which this form of decay has reached.

These two subordinate changes are easily seen by the microscope in the opaque patches on and in the mitral valves; but it is also as easily recognised in the patches of atheroma, as they are called, which stud the commencement of the aorta, and, in many cases, can be detected in remoter parts of the arterial system.

In the form of fatty metamorphosis the valvular disorganization is usually greater, both mitral and aortic valves being implicated; the disturbance to the equilibrium of the circulation is also more manifest than in the first enumerated class, where so little inconvenience apparently results.

In studying, therefore, the dropsical condition as significant of cardiac disease, we must not only satisfy ourselves as to the amount of mechanical impediment to the free circulation of the blood through the lungs and heart, but we must also take into our estimate the correlative changes which are going on, not only in the morbid deposit on and in the valves, but also in the heart itself, as well as in other organs.

First. As to the mechanical impediment. This is too well understood to need either explanation or comment. The imperfections of both the mitral and aortic valves will represent the maximum degree of mechanical impediment which can oppose the current of blood through the heart; an imperfect mitral valve will, according to its degree, cause regurgitation into the left auricle, and embarrassment to the return of blood from the lungs; but an imperfection of the aortic valves may either consist in such a thickening as shall simply cause obstruction, or they may be disorganized so that complete closure is impossible, and not only obstructions to the flow of blood outward by the systole is the result, but a regurgitation of blood from the aortic sinus into the ventricle will be an additional impediment to the integrity of the heart's action.

In both these cases, differing only in degree, the patient suffers from pulmonary engorgement; and bronchitis, hæmoptysis, or pulmonary apoplexy, may severally follow. The extent to which the patient may thus suffer from the effects of heart disease will sometimes be proportioned to the strain laid upon the powers of the heart; and if physical rest and exemption from bodily toil be enjoyed, and if the organism continue well nourished, the heart—even thus disorganized—will continue its functions, although imperfectly, without immediately giving rise to any symptoms of dropsy. But soon the ankles and feet begin to swell, then the legs and thighs; tediously and sluggishly the serous effusion increases; dyspnœa, even without physical exertion, occurs; the lungs become œdematous also: the urine decreases in amount, step by step, as the dropsical condition increases; cough and shortness of breath become more urgent; coarse wheezing murmurs are heard all over the chest; ascites sometimes supervenes; both upper and lower extremities are anasarcous; the cuticle of the legs is distended to the utmost; a painful erythematous redness may be followed by vesications, which burst and distil the serous infiltration of the tissues, and thus is the tension temporarily relieved—or incisions, or scarifications are employed to obtain a like result. There is no abatement of the dropsy; the breathing becomes more embarrassed; and either from increasing engorgement of the lungs, or what may be thought an attack of broncho-pneumonia, the patient sinks and dies.

I will venture to ask, is this frightful and all but invariably unchecked dropsical accumulation significant only of mechanical impediment to the course of blood through the heart? Are we to look for no other cause for this fatal issue than a mechanical one? There has been no *increase* in the mechanical obstacles—they have remained throughout the same—and doubtless have ministered in some degree, by the direct obstruction to the circulation, to impede the return of blood through the right side of the heart.

In fatal cases we have not to search far for abundant evidence that the mechanical conditions referred to in the heart are invariably accompanied both in the structure of its walls, as well as in other textures, by a decay and a degeneration in the elements of the tissues, such as may be demonstrated in renal dropsy. I would, with reference to this part of my subject, venture to recall attention to my observations on the state of the tissues in renal dropsy, but I would merely repeat here that, as in that form of dropsy the morbid phenomena appear to express themselves most significantly by disorder in the function and structure of the kidneys, but are accompanied by unequivocal evidence of a wide-spread deterioration of cell-growth: so in this form of dropsy, which appears to originate in a disorganization of the valves of the heart, there is equally demonstrable a similar state of decay and degeneration, not only in the muscular walls of the heart, but also in the remotest tissues of the organism.

To explain the mechanical development of dropsy from disorganization of the left valves of the heart, it is usually laid down as a rule that dropsical effusion does not take place until the engorgement of the lungs has reached a point by which the circulation or free movement of the blood through the pulmonary artery is seriously embarrassed, and venous retardation in the cavæ has brought about a condition analogous nearly to what we familiarly know to happen when the circulation through a trunk vein is impeded, viz., a state of serous effusion or œdema in all the tissues supplying venous blood to that obstructed vein. Cardiac dropsy, even when the left cavity of the heart is at fault, is supposed to be generated by a series of retrograde effects or impediments beginning in the left cavity of the heart, carried to the circulation through the lungs, imparted to the current through the pulmonary artery, felt in the right ventricle, and thence impeding the freedom of the venous circulation through the cavæ, subsequently through the liver and abdominal viscera, and ultimately through the entire venous system. An obstruction or impediment to the freedom of the venous circulation throughout the body is a very intelligible cause, and is the one usually assigned to explain the accumulation of fluid in dropsy from heart disease. But the mechanical impediment has been the same from the beginning, and in the beginning there was no dropsy. If the mechanical conditions, the imperfection and disorganization of the valves were constantly increasing conditions, the impediments through the heart constantly becoming greater, the mechanical interpretation might be sufficient. But the heart disease, when followed by dropsy, is invariably, and I believe unexceptionally, followed by changes not only in the morbid materials constituting the first stage of the disease, but by analogous changes in cell-growth elsewhere, by which the tissues and cells are eventually rendered incapable of carrying on the functions of health—even of life.

There remains yet the other form of heart disease of which dropsy is significant to mention; and I will postpone the evidence of this wide-spread cell-deterioration, which occurs equally in both forms, till I have sketched the general character and progress of this second variety, since what in cellular deterioration is characteristic of one is also pointedly significant of the other.

The other form of heart disease of which dropsy is significant emphysema and chronic bronchitis, with succeeding dropsy. I have found the same appearances in every case I have examined. Emphysema and chronic bronchitis are so intimately connected the one with the other—the emphysematous patient constantly suffering from bronchitis, acute or chronic, and the lungs of the sufferer from chronic bronchitis so often becoming emphysematous—that in relation to a state of the heart, which is followed by dropsy, they may be taken as identical.

In emphysema there is, proportioned to the wasting or atrophy of the vascular element of the dilated pulmonary cells, a deficiency in the capacity of the lungs for the reception of the blood from the right side of the heart. There must also be taken into consideration a morbid condition, or at least an increased susceptibility of the branches of the eighth nerve distributed to the bronchial membrane and non-striated muscular element.

Partly, then, from the limited area of the pulmonary circulation and a morbid susceptibility to disturbance of the par vagum, spasmonic attacks of difficulty of breathing, and paroxysms of shortness of breath, occur.

The expansibility of the chest becomes narrowed to the smallest limits, and unavailing and abortive inspiratory efforts, marked by the anxious expression of countenance, the protruding eye-balls, the dull, even dusky venosity of the features, the purplish lips, the tongue turgid with venous blood, and the breath deficient in warmth, severally proclaim the embarrassment which the pulmonary circulation suffers. The heart's action becomes hurried and laboured; and unequal efforts are made to drive the impeded venous blood through the pulmonary artery. The action of the heart thus embarrassed continues to labour with abortive efforts. Slowly, day by day, week by week, and month by month, this overstrain continues; occasionally interrupted by periods of calm and comparative ease; but the current through the pulmonary artery, never so free, even in these intervals of calm as it ought to be, continues to oppress and exact the driving power of the right side; gradually and sluggishly the walls of the cavity yield to a passive dilating power. As the dilatation increases, the walls become more and more attenuated, till at length the feebleness of the heart's contractility scarcely suffices to drive the blood forward through the lung; general venosity follows, and a diffuse dropsy, characterised not only by anasarca of upper and lower extremities, but by a persistent blueness or lividity of the lips, hands, and feet, marking in a most striking manner the preponderance of venous, or imperfectly aerated blood throughout the system.

It is not surprising that such impediment to the free circulation of blood through the right side of the heart should be accompanied by serous infiltration of the serous elements of the blood, or that we should accept the dropsical infiltration as significant of feebleness and imperfection of the right heart, arising from exhausting efforts to drive the blood through the impeded lung structures. But the dropsical accumulation in these cases of emphysema and chronic bronchitis signifies something more. Why does the heart become weak,—attenuated? Why is its cavity increased, and its walls enfeebled? It is simple enough to point to the emphysematous lung, with the imperfect process of respiration causing venous blood to accumulate in the pulmonary artery, and to show how the right heart must labour and become enfeebled by this continuous strain. But why does the heart become feeble and attenuated? It is a law governing muscular structures that their nutrition and development are proportioned to their activity. Rest attenuates the ordinary muscles of volition, activity increases their power and energy.

In some cases of mitral disease the left heart is embarrassed, and its activity increased; its walls augment in thickness and contractile power; and the result is an hypertrophied heart, with a contractile energy greater than is needed; a sledge-hammer kind of impulse, and its blood driven with unnecessary intensity through the various organs. Why should not the right heart become hypertrophied; and why should not its energies and nutrition increase with the demands made upon it? I think the appropriate answer is not difficult to find, and the microscope enables us to give the reason. All these cases of dilatation of the right side of the heart with resulting dropsy, are dependent on an extensive fatty degeneration of the entire heart—not here and there a few filaments fatty, but every bundle of fibre alike degenerated and decayed.

Co-existent with, and perhaps as a cause of the pulmonary disturbance (defect), there is, probably, going on simultaneously in both lung and heart the same process of defective nutrition. I have never examined a heart in a case of cardiac dropsy with emphysema in which this fatty degeneration of the muscular fibre of the right heart did not exist to an exaggerated extent. (See Plate XV, fig. 6, and Plate XVI, fig. 6), where the extreme degree of fatty degeneration of heart fibre in both ventricles and auricles is represented.

I think we may now more clearly comprehend why, in these instances of mechanical impediment to the flow of blood through the lung, the heart, in the place of becoming for a time at least hypertrophied and thickened, it becomes dilated, attenuated, and feeble. Why the heart, instead of compensating by a more powerful contractile and driving power, and overcoming the impediments in the lungs, itself becomes more feeble, and yields slowly but surely to the dilating force of a venous accumulation. Its nutrition fails, and its walls are degenerating in the direction which seems to constitute an inherent law of the organism.

Cardiac dropsy, then, is invariably significant of failing and defective nutrition in the parietes of the heart; and in typical and strongly marked cases is accompanied by an exaggeration, as it were, of fatty degeneration, in the form of atheromatous, or opaque patches in the endocardium, even on the tricuspid valve, with large accumulation of oily-looking globules, which are mixed up with the characteristic crystalline plates of cholesterine.

This condition may be most extensively traced in the inner membrane of the aorta; in the vascular layer of the small bronchial tubes; in the fibro-serous sac of the pulmonary cell; in the hepatic cells, and almost in every important tissue of the body. (See Plates XV and XVI.)

I had occasion to remark, when speaking of disease of the mitral valve, that so long as the nutrition of the body continued good, so long was cell-growth healthy; and whatever changes might be going on in the walls of the left cavity, they would be in the direction of augmented muscular structure, an hypertrophy of the walls, and an increased power of the heart's systole. So in relation to the right ventricle, if the nutrition of the body continued good, we should expect that healthy structure would in like manner continue here also, and increased power of the right heart follow. But we have seen that the lung defect is essentially due to a fatty degeneration of tissue. The organism has thus early indicated that the decaying process has already commenced, and probably, step by step with the degeneration of pulmonary tissue there goes on an equal, co-existing decay of the muscular elements of the heart. A heart thus failing in the essentials of its nutrition must eventually become feeble and attenuated, and hence cardiac dropsy signifies, not so much a mechanical imperfection interfering with the circulating current, as a debilitated and ill-nourished organ, becoming feebler and feebler in its contractile power, and eventually unequal to transmit its contents, or carry on the circulation.

Here therefore, as in renal dropsy, we recognise not a local, but a general disorder; a deterioration of cell-development not confined to one texture or organ, but wide-spread, and signifying to us in studying the pathology of these disorders, that it is not to the organ which gives the most prominent indication of disturbance that our examination should be limited; but, if we are to render available the results of our observations for the purpose of treatment, we must take into consideration the evidence which has been here offered, that in these dropsical diseases we have a decaying vitality—a decreasing power of elaborating, or forming out of the elements of food, cells fitted for, and equal to, the performance of their several functions.

## CHAPTER II.

### TREATMENT OF PULMONARY AND CARDIAC DROPSY.

On the subject of treatment I will shortly refer to the leading principles which should govern our advice in all those cases in which the early elements of disturbance, either cardiac or pulmonary, may eventually lead to dropsy.

It may appear too much of a truism to say that the leading feature is, by every means, to maintain the nutrition of the body in the state of the highest efficiency.

But I lay a particular emphasis on this apparent truism, to caution young practitioners against falling into the errors of common routine practice which makes blistering, and purging, and other lowering means, the invariable refuge of the inexperienced.

I can recall to memory the persons of several young people now grown up to manhood, whose damaged hearts and delicate health, the result of rheumatic inflammation, with the accompanying shortness of breath, and inability to take any part in the exciting exercises of youth, became naturally the source of deep anxiety to their parents.

In these cases our chief object should be to place the young patient in the most favorable condition of nourishment. For a time forbidding all bodily or physical exertion, the heart should be left to the influence of quietude; and steel and animal diet the principal means employed.

In a few months a manifest improvement will generally show itself. The pallor of the face will be exchanged for a more healthy aspect; the eye will regain its natural expression; the bodily vigour will improve; and, in a moderate time, the youthful instincts of activity and exercise will replace the sense of languor and indifference which formerly existed. Care is needed now to limit the amount of exercise, or rather to prevent it taking the form of those efforts in which youth delights, when the heart's powers are momentarily put to greater strain. With such precautions continued up to, and sometimes beyond puberty, the general health being maintained, and no strain being put on the physical powers, the patient in the middle and upper classes of life may attain, not perhaps the average duration of life, but at any rate may reach the middle, and, in many cases, even beyond that period, in the fair enjoyment of but little less than falls to the lot of the more vigorous and healthy.

I will briefly refer to the other form—that in which the heart becomes implicated chiefly through the pulmonary disorder.

The leading, the earliest, the most manifest symptom is the cough and expectoration. Pathologically, I would say, the most instructive and suggestive symptom is the expectoration.

In health no cells are thrown off from the bronchial mucous membrane. A protective layer of ciliated epithelium stretches from the larynx to the entrance of the pulmonary cell. But in chronic bronchitis, and emphysema, a glance at the amount of expectoration in twenty-four hours (bearing in mind that this expectoration is composed altogether of cells and the débris of cells derived from this large extent of surface) will convince us of the exhausting and depressing process which is continuously advancing.

If from the copious expectorated matters in emphysema and bronchorrhœa we take up on the point of a needle a morsel of this muco-purulent expectoration, so small as to be scarcely visible to the naked eye, the microscope reveals to us myriads of cells in which the mucus- and pus-cells predominate: let us reflect for a moment that half a pint, or even more, of this débris of effete cells is thrown off from the bronchial membranes in a few hours, and then ask ourselves to estimate the expenditure of formative power required to produce this mass of excreta.

A surgeon, when he has to deal with a suppurating surface, relies mainly on nutrition and support. The material excreted in chronic bronchitis differs only from the purulent outpouring of a suppurating surface, in that its cellular elements are more varied, and are not developed at the expense of the interstitial subjacent tissue. But so far as the throwing off of these transitional forms of epithelial cells, the demand made on the vital energies is equal to that called for by a suppurating surface; and, in my opinion, needs a not less careful attention to the sustentation of the powers of the individual.

Old theories still haunt our practice, and an aggravation of cough and expectoration is still regarded by many as the signal of that imaginary entity, inflammation; instead of this, increase in the gravity of the symptoms in reality signifies a harassed and labouring circulation, a defective nutrition, and an exhausting development of ill-matured cells.

In every case of emphysema and chronic bronchitis, long before any cardiac complications are manifested, generous living, fresh air, moderate exercise, and the disuse of every remedy that is the least depressing in its influence, constitute the rules of treatment which the pathological facts I have brought forward both encourage and justify.

Among medicinal remedies in these cases of pulmonary and cardiac dropsies, there are few which exercise so beneficial an influence as digitalis, either alone, or in combination with some form of Iron.

In this description of the pathology of dropsies arising from pulmonary or cardiac disease, it must not be overlooked that sooner or later in the progress of the disease, the kidneys become involved in the disturbance either temporarily or permanently. Scanty albuminous urine, with a sensible increase in the dropsical fluids are the earliest indications of this complication. The urinary sediment at this early stage of the renal disturbance, will, through the microscope, exhibit a few coarse granular casts from the straight tubes. There may be also a few slightly granular and hyaline from the smaller tubes. There is yet no sign, or but faint, of broken down or degenerating cell-structure; no cloudy or compound granule-cells. This disturbance in the function of the kidneys appears at first to arise simply from impeded circulation through them, caused by the indolence of the current through the cava into which the renal veins directly empty themselves. A state of circulation through the kidneys is at first induced which materially affects the activity of the excretory function; and scanty urine, high coloured, but free from albumen, announces the embarrassment which the organ suffers. If this continue, the urine soon becomes albuminous, and the sediment of such urine usually shows the presence of coarse granular casts, without, however, any amount of renal epithelium or other condition indicative of renal degeneration. It is simply a state of albuminous urine from mechanical obstruction to the freedom of the renal circulation. It is also increased by the state of tension caused by the dropsical effusion infiltrating the tissues; for the symptoms of renal disturbance are graver in proportion to the extent and presence of the dropsical fluid. Relief is sometimes obtained by brisk hydrogogue purgatives, which by relieving tension, set free the current of blood through the kidneys, and for a time at least restore their activity. If these measures fail, if the dropsy either increases or even does not decrease, in a certain time, the urinary sediment will indicate that the renal structures are becoming disorganized. The patient up to this point may not have suffered more from the dropsical tension than what is caused by the heavy inactivity of the limbs; there may not be any inflammatory or painful distension of the cuticle; the fluid in the belly may not be sufficient to inconvenience the breathing; yet if the urinary sediment suggests by the presence of disintegrated cell-material the commencement of some organic change in the kidneys, immediate relief to the tension of the tissue must be attempted by puncturing the lower extremities. The manner of doing this is of more moment than some are inclined to think. Pricks or simple punctures with the lancet-point are not only oftentimes inefficient, but from a diffuse inflammation which sometimes follows, really injurious. Two incisions should be made, from below upwards under each internal malleolus. These should be made by a lancet being inserted up to, and even beyond its shoulders, so as to cut freely through the subcutaneous connective, or areolar tissue. The direction of the incision permits a free drain downwards of the dropsical fluid; and in the majority of cases a most effective, painless, unexhausting drain is established; the kidneys are set free, a daily augmentation in the amount of urine, accompanied by a proportionate diminution in the proportion of albumen present, testify to the relief obtained, and in some cases a permanent, and in many a most satisfactory, even though it be temporary, recovery will date from this period. The remedies of most importance at this critical period are those which assist and repair the decay, which is inevitable in any tissues, so long as they are infiltrated by dropsical fluid. The subsidence of the dropsy, even though thus artificially induced, affords a prospect of still further improvement, proportioned to the integrity and vigour of the digestive organs.

It may easily be conceived that a more confident hope may be expressed of the favorable progress of those who take food without reluctance and even with appetite, and who suffer no more distress or uneasiness from flatulence while digestion is progressing, than can be expected in those whose digestive powers are weak and imperfect. Accordingly, in those ranks of life where variety of aliment can be commanded, where selection can be made governed by the judgment of the physician, or in hospital practice, where just that kind of food in quantity and quality calculated for the individual case, is appropriately ordered, the most satisfactory and favorable results are witnessed. An incontestible proof how essential, as a remediable measure, the doctrine of nutrition and support has become in these forms of disease.

Whatever medicines are employed, should be auxiliary to this object; and except so far as special or occasional symptoms may require expectorants, or diuretics, or purgatives, the fundamental treatment by nutritive agencies should never be forgotten. All medicines which increase or assist the digestive function, which promote the assimilative powers, and which facilitate the formation of a purer blood, are to be preferred to those of a lowering or exhausting character, which in another generation were so fatally selected for the treatment of these dropsies.

The regulation of the diet in all cases of dropsy, whether renal, pulmonary, or cardiac, is of more importance than has hitherto been conceived.

The leading feature in this branch of treatment consists in the selection of those articles for food which the individual best assimilates, and which most directly influences the formation of blood. The fastidiousness of the appetite must be indulged; all slops, broths, and thin watery soups banished, and wherever possible, nutrition conveyed in the most concentrated form. The fatty elements of food should not be neglected, recognising fully the important part the fats play as agents in the conversion of animal matter into the solids of the body.

If any authority beyond that of observation, or any proof beyond that of the success which attends the treatment of dropsy based on these principles were required, the authority of so distinguished a physiological chemist as Lehmann might be quoted. No animal cell and no fibre is formed independently of the presence of fat; indeed, the fat appears to possess the property of predisposing the animal organism to the formation of cells. Besides the manifold mechanical services which they render the animal organism, the fats also take part, through their chemical metamorphoses, in the most varied animal processes; and they take an active part in the process of digestion in the *primæ viæ*, and that they preside generally over all the processes by which the fluid nutrient substances are converted into the solid substances of organs. The formation of the colourless blood-corpuscles seems also to owe its first impulse to the metamorphosis of fat, which thus serves as the most important auxiliary in the formation of blood.*

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* Lehmann's 'Physiological Chemistry,' Sydenham Society edition, p. 211.

The observations of the physiological chemist have been abundantly proved by the experience of the physician. Nutritive material selected on the principles here enumerated has repeatedly been the means of prolonging life, and even controlling and arresting the disease.

The advantages of a well-regulated nutritious diet in the management of these forms of dropsy cannot, perhaps be better proved than by contrast, for far otherwise is the fate of those in another class of life whose livelihood depends on their physical powers, which are soon enfeebled and prostrated by chronic bronchitis, emphysema, or heart disease. Their condition thus aggravated by defective nourishment, scanty clothing, and, perhaps depraved and irregular habits, in these the progress of degeneration is rapid. The tissues everywhere, as in renal dropsy—slowly in some cases, more rapidly in others—lose their power of selection of nitrogenized material for the development of vigorous cell-formation. The structures insidiously, but fatally, descend in the scale of development; and tissues, the cells of which should be distinguished by a nucleus of highly nitrogenized matter, now possess but the power of abstracting hydro-carbonized products, and a fatty and amyloid degradation of cell-structure is the all-pervading pathological law—conditions which, as they proceed, give unmistakable evidence of decaying powers, and at length reach a point incommensurate with the continuance of life; and the organism which, in the fulness of its life and vigour, was but the expression of the sum of the life of its individual cells now perishes, and yields up its forces to other laws and other combinations of matter.

## CHAPTER III.

### HEPATIC DROPSY.—KIDNEYS NOT NECESSARILY IMPLICATED.

HEPATIC DROPSY offers fewer complications for investigation than renal or cardiac dropsies. Not because diseases of other organs infrequently coexist, but because they are, for the most part, either independent of the disease of the liver or only remotely connected with it. In cases where the hepatic disease owes its origin to intemperate habits, or the pernicious abuse of alcoholic stimulants, we may not unreasonably expect indications of disease in the brain and kidneys or spleen, which, springing from the same exciting cause, have probably run their course simultaneously with the liver disorder.

The affections which are chiefly developed by the hepatic disorder are those of the stomach, intestines, and peritoneum. Various forms or groups of symptoms significant of indigestion, followed by diarrhœa, and even in some cases by dysentery, are clearly traceable to the impeded circulation and deranged function of the liver.

Therefore, while disease of other great central organs may similarly exercise a disorganizing influence on the liver, as when in obstructive diseases in the chest, emphysema and dilatation of the right side of the heart, or in pneumonia or pleurisy, and particularly in advanced phthisis, the circulation through the liver is influenced by the obstruction to its free passage through the cava, and a process of disordered nutrition, followed by fatty and amyloid degeneration, is not infrequent, yet, taking the disease of the liver as the starting-point, the diseases usually subordinate to it are for the most part limited to those organs and tissues from whence the portal blood is derived.

The significance of dropsy of the belly may be estimated from two points of view.

First, as to the nature of the disease of the liver, spleen, or heart, which conduces to the dropsy.

Secondly, the means of relief or cure, and the most efficient remedies to obtain these results.

I will observe here that fluid may accumulate in the belly independent of obstructive disease in the liver, spleen, or heart. But when this is so the dropsical accumulation arises from a wide-spread diffused dropsy of all the tissues of the body, as occurs in renal dropsy, and particularly in the dropsy after scarlet fever and in the form of acute morbus Brightii already described. The liver in these cases is in no way concerned in forming, or causing to accumulate, the fluid in the abdominal cavity. It arises from a universal stagnation in the capillaries throughout the body, from altered physical properties of the blood from retained excretory products. It is formed quickly, in a day or two; and in favorable cases it as quickly disappears. The equilibrium of the circulation being restored, the fluid disappears, is quickly reabsorbed, and carried out of the system by the skin, intestines, or kidneys. Dropsy of the belly also may be produced by peritonitis; but the antecedent symptoms in both these forms of disease will sufficiently declare the source of the dropsical symptoms, and their significance will not be mistaken. It is also a sequel to malignant disease of the liver, scirrhous or encephaloid.

Having thus eliminated the other causes of abdominal dropsy, I arrive at the starting-point of my inquiry. What pathological state or disease of the liver particularly does the presence of fluid in the abdomen indicate?

I will for the present exclude from the inquiry the states of the spleen or heart which may lead to ascites, because the liver must still become the secondary agent of its development.

### HOW THE DROPSY IS CAUSED.

I need hardly dwell on the manner how any impediment to the free flow of blood through the portal system of vessels in the liver will, by its retrogade influence, be felt in the remotest venous capillaries from which that system springs.

But it is not a little singular that these venous capillaries taking their rise in the chylopoietic viscera, and having their origin in the spleen, pancreas, stomach, and entire mucous surface of the intestines, and suffering, from the retrograde influence commencing in the liver, that degree of stasis, or stagnation, which is followed by the transudation of the serous elements of the blood which constitutes dropsical effusion, should permit the transfusion of fluid to appear only in one direction,—always making its appearance on the serous and not on the mucous surface of the intestines.

We might suppose that a ready escape for the transuded serum would be found in the direction of the mucous surface, instead of its being pent up and accumulated in the peritoneal cavity—that diarrhœa and watery stools would be the ordinary conditions of obstructed portal circulation, instead of the abdomen being flooded, and for the most part a state of inactivity marking the functions of the intestinal canal. Very rarely in hepatic dropsy does a spontaneous diarrhœa bring relief; on the contrary, it frequently happens that the most active hydrogogue or drastic purgatives fail to produce any sensible effect in reducing the watery accumulation in the belly. If we turn our attention to the structural elements, the minute histology of the intestinal canal, we may, perhaps, find some explanation of this fact. But even with this aid I cannot but think that further investigation is required to explain this phenomenon satisfactorily.

The great abundance of the epithelial elements, the numerous glands and villi, with their epithelial coverings, may be thought to offer an impediment to the transfusion of the watery parts of the blood in the direction of the canal, leaving the fluid to find its course through the less resisting serous layer.

Anatomical considerations offer the following explanations :

First, that the epithelial layer, with its glandular apparatus and tissue in which the roots of the portal capillaries take their rise, offer an obstacle to the transudation of fluid greater than is met with in the direction of the serous coat.

Secondly, that the function of this mucous layer being absorbent, and the direction of its fluid movements always from without inwards, a transudation of serous fluid from the serous capillaries would more likely be determined in the direction of the serous coat than *against* the absorbing current of the mucous layer.

Keeping in view, therefore, the several functions of the peritoneal or serous layer and the intestinal or mucous layer, we see that the serous is an exhaling and the mucous an absorbing surface. The direction of a fluid forced out of the portal capillaries by an obstruction in the main portal current would then most reasonably be with the fluids moving towards the exhaling surface, rather than against the current coming from the intestinal villi in the direction of the lymphatics.

I am far from accepting these anatomical considerations as the most satisfactory explanation of the transudation of serum only in one direction. Perhaps we have not, in investigating this form of dropsy, paid sufficient attention to the conditions of the spleen. This large organ and receptacle for blood must feel the effect of the obstructed circulation through the liver in a degree proportioned to the amount of blood passing through it. The greater part of the fluid in ascites may in all probability be derived from the stagnation of the current through that organ.

Ascites may either be significant of disease of the liver or spleen or it may be the accompaniment of a more diffused dropsy, as in Bright's disease or in diseases of the lungs and heart giving rise to dropsy. These have been already noticed. I propose to limit my observations to ascites from diseases of the liver or spleen, but more particularly to the ascites from inflammation, hypertrophy, or cirrhosis of the liver. I will first enumerate the diseases of the liver of which ascites is significant.

I. Engorgement, inflammation, or hypertrophy of the liver.
II. Cirrhosis or hobnail liver, a sequel to the antecedent condition, disorders for the most part developed by preventible causes.
III. Diseases of the spleen.
IV. Malignant disease of the liver.
    I. Scirrhus.
    II. Encephaloid.
    III. Fungus hæmatodes.

These latter arise from a certain peculiarity of constitution, and are not predetermined by any causes within reach of prevention. Ascites may be caused by or associated with other diseases, as chronic peritonitis, particularly the tubercular form, or it may arise from malignant disease of the stomach, pylorus, duodenum, which, by pressure on the vessels entering the liver, may induce effusion as effectually as any disease within the liver itself.

In glancing over the above list of the causes of ascites it must be apparent to a reflecting mind conversant with the etiology and pathology of these diseases that the first two embrace forms of disease which, arising from intemperance or climate, or both, may be said to be preventible, and consequently are amenable to treatment. The foundation and origin of these disorders are to be traced to the habits of life of the individual. I propose to limit my observations to the antecedent conditions and symptoms which most commonly in this country lead to hypertrophy or enlargement, and subsequent shrinking or contraction of the liver, and eventually to dropsy of the abdominal cavity.

I designedly limit my observations to the two most common causes of ascites, hypertrophy and cirrhosis, because in this metropolis they are by far the most numerous. They arise out of the habits of the individual, they are preventible, and they are, if timely treated, remediable.

Rarely, most rarely, in these days, I believe, is ascites traceable to marsh-fever or ague. The virulence of those intermitting diseases which once ravaged the fen and undrained districts of the country has long yielded to the march of improvement and the reclaiming of the marsh lands. Intermittent fever, quotidians, tertians, and quartans, still prevail at certain seasons and in certain localities, and among certain classes of the agricultural labourers, pea-pickers, hop-pickers, &c.

But the ague of this day is not the disease of forty or fifty years ago; we rarely see now those strongly marked cases of marsh cachexia with which I was familiar as a student, nor are the visceral diseases that followed in the wake of those agues so frequently met with at the present time as formerly. Hepatic disease, splenic induration,—ague cake, was then not rare—ascites often followed; but the infrequency of this source of hepatic disorders, the precursor of dropsy, tempts me to pass on to the consideration of those causes which are still active in the development of one of the most intractable diseases which can engage the attention and experience of the physician.

To the abuse of alcoholic stimuli, I think, must be traced the source of the evils which eventually lead to this form of dropsy.

It becomes a question of great interest to the pathologist to determine how, and in what way, alcohol induces these diseases of the liver.

It is not so much the quantity as the time and period in reference to the digestive process at which the alcohol is taken that renders the spirit so peculiarly noxious, first to the functions, and secondly to the structure, of the stomach and liver.

Of the penalties which attach themselves to the improvident and excessive use of fermented drinks none are so certain and determined as disorders of the liver. The effects produced on the nervous system by the habitual and immoderate indulgence in spirituous liquor may vary in different individuals, but the effects on the liver, if not identical in all, differ only in degree and intensity.

Of twenty persons addicted to intemperance two may suffer from delirium tremens, for it by no means follows that all will; but none will escape the effects of disordered liver functions and ultimate disorganization of this important organ.

We certainly meet with a great number of intemperate people who do not suffer from liver disease and dropsy, but who lay the foundation by their habits for other and not less serious diseases. It appears, then, that the dram-drinkers, even though they be not intemperate, are those who chiefly suffer from hepatic dropsy. By dram-drinkers is meant those who not only take raw spirits, but who do so habitually on an empty stomach. The action of crude spirit on an empty stomach is well known. The observations of Dr. Beaumont have made clear to us this action. A diffuse rose-red injection, followed by a deeper and more permanent redness, appear to result from immediate contact of the spirit. The activity of the gastric glands is diminished; an imperfect and defective supply of gastric acid results. The spirit passes immediately into the portal circulation, for it is rapidly absorbed and taken up by the roots of the coronary veins, and thence passes either into the splenic vein or sometimes directly into the trunk of the portal vein and thence into the liver.

It would appear that the blood thus charged with alcohol exercises some immediate and direct effect on the portal canals, and a state of chronic hepatitis follows.

### HEPATIC ENGORGEMENT.—CHRONIC HEPATITIS.

The following may be considered a typical case of this form of liver disease brought on by dram-drinking, and eventually, if unheeded, leading to cirrhosis and dropsy of the belly.

Case XXXI.—Michael S—, æt. 46, was admitted Feb. 14th, 1860, having, a day or two previously, vomited up a quantity of blood. He complained of pain and uneasiness in the right hypochondrium, as well as at the pit of the stomach. There were loss of appetite, retching after food of any kind, and for many months past the stomach had been very irritable, and he had vomited on first rising in the morning. There was faint lemon-coloured tinge of the skin, and the conjunctivæ were yellow tinted, scarcely enough to be called jaundiced. The abdomen was hard and tense, particularly in the region of the liver. The extent of this organ, as indicated by percussion, was beyond the natural limits. Some tenderness was experienced at the margin by pressure; the epigastric region was also full and prominent, and sensitive to pressure; the bowels were tympanitic, and he suffered much from flatulence. No fluid could be detected in the abdominal cavity. He had not been able to recline on the left side for many weeks, and slept only on the right; if he turned to the opposite side, a dragging, uneasy, and painful sensation was produced, which lasted as long as he remained in that position. The urine had been scanty, with a pinkish deposit, for some time past, and the dejections pale, yet oftentimes black and dark. He had vomited blood more than once, but never in such quantity as just before admission. He had jaundice and symptoms something like the present about twelve months since. His employment had been various, principally on the river, and he appeared to have indulged for years in spirits whenever he could get them. Rum seems to have been his favorite spirit, and he never began work in the morning without a quartern. Without giving credit to him for the quantities he stated that he had taken daily, there can be no doubt that, though not a drunkard, he had habitually, on an empty stomach, consumed spirits to the detriment, if not destruction, of his liver. For weeks together the stomach had not been able to retain solid food, and it is not a little singular upon how small a quantity of solid or nutritious food these spirit-drinkers sustain their physical energies, and are able to continue their daily labour. They will often tell you that for weeks they have not eaten a piece of bread the size of their hand, or meat beyond a mouthful or two. The stomach rejects almost everything it receives except the fiery fluid, which it craves.

The characteristic symptoms, then, were the irritable stomach; frequent retching, and rejection of solid food; heavy dull aching weight in the right hypochondrium, aggravated by lying on the left side; an attack of hæmatemesis, and an icteritic tint of the skin and conjunctivæ. He was ordered blue pill and colocynth for a purge, with an aloetic draught in the morning; and he was to take, three times a day, the decoction of dandelion, with ten grains of the hydrochlorate of ammonia and ten of the sesquicarbonate of soda with each dose. He was cupped to four ounces over the region of the liver.

Two days after admission the irritability of the stomach ceased, and he was able to retain some farinaceous food. The tension, however, and pain in the hypochondriac region were unabated. The dejections were slightly more healthy in appearance; the urine became clear, and the pink lithates disappeared, and its specific gravity was 1·017.

On the 20th, six days from admission, the dejections were reported to have a well-marked bile tinge in them, and the patient began to experience a relish for food. There had been no vomiting since admission. The hypochondriac region continuing very tense and hard, and the dragging uneasiness when resting immediately on the left side suffering no diminution, the hepatic region was directed to be painted with the strong compound tincture of iodine.

On the 29th, a fortnight after admission, the report stated a manifest improvement. The appetite had become natural, and the patient expressed a relish for food which he had not known for the last two years. As often happens in these cases, the desire for food often exceeds the power of the exhausted stomach to digest easily what is received, and distressing flatulence often marks this period of the case. A cautious selection of food, both as to quality and quantity, and the employment of carminatives, will successfully relieve this symptom. The aromatic spirit of ammonia and ginger were added to the medicine. Several applications of the iodine paint to the right side were followed by marked improvement in the condition of the patient. For several days the lemon-coloured tinge of the skin had disappeared.

On examining the abdomen on the 2nd of March, sixteen days from admission, the surface walls of this cavity no longer presented the hardness or fulness formerly noticed. Pressure was more easily borne, and the area of hepatic dulness was certainly within narrower limits, although still much beyond what would mark a healthy organ. No difficulty was felt on lying over on the left side, and the dragging pain had completely subsided. The bowels required management, for they were apt to get torpid; but small doses of colocynth pill, with one or two grains of blue pill, regulated this function sufficiently well. The last report stated that the dejections were assuming a natural colour.

It was not supposed that, because these symptoms had thus far proceeded satisfactorily, the liver had returned to a sound and healthy state. The limits of hepatic dulness were far beyond their proper area; but nevertheless it was conceived that the more active condition of disorganization had been checked, that the engorged liver had been relieved, and that the more serious evil of hepatic dropsy, for a time at least, had been arrested. All would depend on the habits of the individual.

These attacks of chronic hepatitis, except in the mildest form, lead to the formation of organizable matter in the portal canals, with temporary increase of size of the liver more or less pronounced. Eventually, the state of cirrhosis or shrinking of the organ follows. Abdominal dropsy may be the consequence of the earlier stage, that of engorgement or chronic inflammation, as well as of the latter, or stage of cirrhosis. If it be the consequence of the first, it may be successfully treated; if of the latter, it can only be temporarily relieved.

This more unfavorable stage follows the earlier one of simple engorgment with a tardiness or rapidity directly proportionate to the abstinence or indulgence in spirituous liquors. It may not be uninstructive to reflect again on the action of the process which so certainly leads to fatal disorganization of the liver. It has been already stated that the disease is for the most part found in spirit, or dram-drinkers. Persons of vitiated or intemperate habits, who drink wine or beer, are not so prone to this form of disease. In them it may be said that the nervous system or kidneys are more prone to suffer. The crude spirit in the dram-drinker enters the system under different circumstances to those which accompany the use of wine or beer, or even diluted spirit.

The spirit-drinker, for the most part, takes the raw undiluted spirit, or dram, on an empty stomach. Fasting, in the morning, and at intervals through the day, the dram takes the place of the ordinary meal; for the spirit has essentially deprived the palate of its desire and the stomach of its power to digest solid food. It is well known that spirits completely suspend the secretion of the gastric fluid. The spirit thus received by the empty stomach passes at once, by absorption, to the portal vessels, and in its admixture with the blood, while passing through the liver, it appears slowly and most insidiously—for it is only when the taking of spirits fasting has become grafted into a habit that these morbid effects follow—to set up a sluggish and chronic form of inflammation along the portal canals through the liver. At this period the state of the liver and portal system of vessels is one of engorgement or blood stasis. This continuing, the usual effect follows—the formation and deposit of lymph in the areolar structures surrounding the portal vessels, or, in other words, in the portal canals. It is this engorgement and subsequent effusion of lymph which constitutes the state of chronic inflammation, and gives rise to the fulness and tension and sense of weight and dragging in the right hypochondriac region.

Now, this is the state in which the liver of this patient was found on his admission. In his case it was not the first attack of engorgement he had suffered, and the symptoms were, therefore, the more strongly pronounced. And that something more than congestion or hyperæmia of the liver existed, was inferred from the hæmatemesis, which rarely occurs till after considerable obstruction and obliteration of the portal vessels have been accomplished. Now, it will probably be asked, why is it that similar effects do not follow the drunkard from other forms of alcoholic stimuli? First, in beer the spirit is largely diluted, and is, moreover, combined with glucose, and oftentimes with small quantities of unchanged dextrine and other organic matters; on all these the stomach exerts its solvent and digestive action. The alcohol thus is not so immediately carried into the circulation, nor does it exercise so poisonous an influence on the blood. Though wine contains far more alcohol than beer, yet those who drink wine for the most part consume it after meals; it is thus received during the primary stages of digestion, and its chief injury consists in retarding or weakening the digestive process, and its alcohol does not reach the liver under the same deleterious conditions as crude undiluted spirit. Here, then, is the explanation why raw spirits so frequently lead to atrophy and shrinking of the liver, and why beer or wine drinkers are comparatively more exempt. The state of the liver of this patient was that of augmented bulk from the deposit of adventitious tissue in the portal canals. The first stage of cirrhosis is, therefore, one of enlargement, from the effects of a chronic or subacute inflammatory process, which is succeeded by a deposit in the channel of the portal vessels. The subsequent shrinking or atrophy of the organ is explained by the contraction of the fibrous tissue into which the lymph is converted that was formed during the inflammatory stage. Nor is it alone by the shrinking of the adventitious tissue that the atrophy and nodular or hobnail surface is produced. Dr. Budd, in his excellent and valuable work "On Diseases of the Liver," shows that this contraction of the tissue compresses, and even obliterates, the smaller portal veins; and the parts which they supplied become atrophied or destroyed, as any organ would be the vascularity of which was diminished, and the secreting power of which was also proportionately decreased. But, in this case that stage had not yet arrived; for (March 15th) the liver, when mapped out by percussion, occupied an area greater than natural; so that the organ represented the stage of recent deposit of lymph—before its more fluid parts had been removed—or it had become converted into fibrous areolar tissue.

In these cases of hepatic engorgement from the evil effects of spirit-drinking, after the relief of the leading hepatic symptoms, there usually follows, or rather remains, a marked debility in the powers of digestion, usually indicated by distressing flatulence after food, and a sense of uneasiness and oppression during the early stage of this process.

This arises from the imperfect formation of the gastric juice, originating, doubtless, in the impeded circulation through the liver. Whatever hampers the return of blood from the stomach through the portal system causes a stagnation or remora of blood in the gastric mucous membrane and follicles, and such a retardation impedes the secretion or formation of a perfect gastric juice. If the food, on being received by the stomach, is not immediately acted on by a well-elaborated gastric solvent, it quickly undergoes molecular changes, which are more akin to chemical than to vital processes. Various gaseous products are formed, which distend the walls of the stomach, and still further impede the formation of the true gastric acid. The patient feels oppressed and heavy, and full and distended. The direction from which relief of these symptoms is to be expected is from an increased activity of the hepatic function, and this is often readily obtained at this stage of the disease by small doses of blue pill and ipecacuanha. Two grains of blue pill and one of ipecacuanha should be given every night, or alternate nights, for several doses. The object is not to salivate, but to increase the activity, if possible, of the portal circulation through an increase in the secretion of the bile. Or small doses of ipecacuanha, half a grain, may be given shortly before meals with the effect of materially increasing the digestive powers and exciting the energy of the gastric glands.

The following case also illustrates how effectually the earlier symptoms of chronic disease of the liver in spirit-drinkers may be made amenable to treatment.

Case XXXII.—Samuel M—, fifty-six years of age, of a stout, somewhat obese habit of body, was admitted Feb. 24th, having for several days before admission vomited a considerable quantity of dark-coloured clotted blood. He thinks that upon one occasion as much as three pints were vomited. He appears like one who had suffered from severe hæmorrhage;

his cheeks were blanched, lips white, inner edge of eyelids exsanguineous, and tongue pale and flabby. The epigastric region was full, and there was some tenderness on pressure. He felt a dull, heavy, dragging pain in the right hypochondrium. For many days the dejections had been very dark and discoloured. The urine was very high-coloured, specific gravity 1·018, and on cooling there was a plentiful deposit of pink urates. These pink urates are very common in all these hepatic disorders. On examining the abdominal region some degree of fulness was observed in the right hypochondrium; the margin of the liver extended two fingers' breadth lower down than was natural, and dulness extended upwards beyond the usual limits. He stated that he suffered a similar attack of blood-vomiting last summer. These attacks were always preceded by loss of appetite, and nausea and retching on first rising in the morning. He had had little or no relish for solid food for a year or two. His occupation in life had been that of a gentleman's servant, principally in the capacity of butler; but, having left service, he enjoyed remarkably good health till he was tempted to take a public-house in a village on the banks of the Thames. Here either the temptations were too great, or the customs of the trade, as some will insist, led him to the pernicious habit of dram-drinking; about three half-quarterns he confessed to have been his daily allowance. Now, it is perfectly immaterial whether this was the maximum or the minimum of his daily potations. It suffices that he fell into the habit of taking spirits on an empty stomach—sometimes undiluted, sometimes otherwise—and that this habit was followed by defective digestion, loss of appetite, nausea, vomiting, and subsequently violent attacks of hæmatemesis. In this case there was no jaundice, no tinge of yellow—not the faintest—of the conjunctiva, and there was no uneasiness experienced on lying on the left side. The symptoms were altogether milder than in the last case; but then the habits of this patient had not existed for more than a year or two, and, fortunately for his future health, had been effectually checked, and his exposure to temptation suddenly withdrawn, by the abrupt termination of his occupation, his relentless landlord thinking that another tenant might sell more and pay better. A brisk purgative of calomel and colocynth, followed by a warm aloetic draught in the morning, operated favorably. He was ordered the liquor taraxaci, sesquicarbonate of soda, and ammonia.

Four days after admission he was reported as much better; no vomiting, or even nausea; the stomach retained simple articles of nutrition—beef-tea and arrowroot. On the sixth day, as some fulness and weight were still experienced in the right side, he was ordered two grains of blue pill and one of ipecacuanha at bed-time for four nights. The alvine dejections assumed gradually an improved appearance, and the urine became quite clear, natural, and pretty abundant; the tongue was clean, although pale; the epigastric tenderness had disappeared; and the patient began to crave for food—to feel hungry—a most important and a most encouraging symptom in these cases. After he had continued a fortnight under treatment the chief indication became to supply, if possible, the great blood loss he had sustained, at the same time taking care that the weak digestive powers and the impeded hepatic function were not too much overtaxed. Gradually he was able to take and relish the full-diet allowance of the hospital. To regulate the bowels, gently stimulate the flow of bile, and help to promote the blood-forming powers, he was ordered each night eight grains of the aloes and myrrh pill, with half a grain of the sulphate of iron. Under this treatment he progressed so favorably that on March 10th he left the hospital in a condition very favorable to the arrest of any further disorganization of the liver, provided he avoided the injurious habit which had brought on this serious attack. A complete recovery may be expected in this and similar cases in the *earliest* stage, where the habits of the patient, either by the force of resolution or of necessity, are ultimately regulated by the dictates of sobriety and self-denial.

Even in cases where the amount of liver disorganization has reached the point in which abdominal dropsy, even to a maximum degree, has of necessity followed, medicinal treatment may relieve the patient, and the operation of tapping be unnecessary.

Case XXXIII.—A man about fifty years of age, whose drink for fourteen or fifteen years had been gin, spending, according to his own account, fourteen shillings weekly in drams, suffered, when he first came under Mr. Pearse's care, from ascites and some anasarca of the lower extremities, gradually and almost imperceptibly increasing. The propriety of tapping became the question to be solved. I found him propped up in bed, the horizontal position being impossible. The abdominal walls were distended till the surface of the skin glistened, it was so smooth. The evidence of fluid by succussion was undoubted; the superficial abdominal veins were much enlarged, and anastomosed upwards freely into the branches of the external mammary and intercostal vessels. There was considerable emaciation of the trunk and upper extremities—always the more striking in these cases from the distended abdominal walls and roundness of texture of the lower extremities from the existence of anasarca. The breathing had become difficult at times, but there was not urgent dyspnœa. The heart sounds were quite natural. The urine was very scanty, high-coloured, and presented a copious deposit of pink urates. His history was that of a dram-drinker. Morning, noon, and night, the "half-quartern" worked its insidious and baneful effects: loss of appetite, nausea, morning sickness, inability to take and absence of all desire for solid food, and at length one or two attacks of hæmatemesis plainly told the progress the disease was making. Yet, strange to say, these signs carried no warning with them. And thus it ever is: the bane is mistaken for the antidote; the poison is accepted as the remedy; and not, perhaps, till unmistakable signs of dropsy, sufficient to interrupt the patient's employment, have shown themselves, does he seek medical advice, and learn, when it is too late, that his disease is of his own creating, and that the habits of years have been the fatal source of his premature decay. This patient had been very judiciously treated with diuretics and elaterium, but without producing any effect on the dropsy, which seemed so much on the increase that the only relief expected was from tapping. But as this operation should never be resorted to till all other remedies have failed, and there exists such impediment to the respiration by the upward pressure of the fluid on the diaphragm that life is jeopardised, I advised that trial should be made of other diuretics and other purgatives. An examination of the urine having satisfied me that no renal complication would interfere or prohibit the use of these remedies, he was ordered the tincture of digitalis, with half-drachm doses of the sweet spirits of nitre, and ten grains of the acetate of potass, every four hours; and the bowels were to be kept active by the compound jalap powder, in drachm doses every morning. The question of tapping was postponed for several days, that it might be seen what relief was to be obtained from this treatment. In two days the breathing was found to be materially relieved. The powders had acted briskly, and already the kidneys had begun to excrete more freely, for the urine had become abundant and clear. He had not slept for many nights before this, from the distress to his breath, but he now had several hours' quiet refreshing sleep. In eight days a great improvement became apparent. He was able to take solid food; all anasarca from the lower limbs had disappeared; the abdominal walls became much softer; he could breathe freely, and had natural and refreshing sleep. The last I heard of him was, that the abdominal parietes had decreased to their natural limits, with obscure sense of fluid in small quantity.

By reference to these, which may be considered as typical cases of the form of disease which leads to dropsy of the belly, it will be seen that the functions of the stomach are the first to exhibit indications of derangement, and these become the more marked in proportion to the obstructed circulation through the portal system. This disturbance will show itself long before any palpable indication of fluid in the belly becomes apparent. There is reason to believe the effusion commences at the earliest period, and keeps pace, according to Frerichs, with the liver degeneration. The small amount present in the early stage is not only overlooked, but it is extremely difficult to detect from the amount of tympanitis usually present.

The most obvious gastric symptom in the earliest period is a certain disposition to retching on first rising in the morning, with more or less evidence of gastric catarrh, marked by the bringing up of a frothy mucous fluid like whipped or frothed white of egg. Coexistent with this symptom is loss of appetite, amounting sometimes to positive inability to eat except excited by the stimulus of a dram, and even then the smallest quantity of solid food will suffice; severe attacks of gastralgia are not infrequent. There is, more or less, epigastric tenderness and torpid bowels; and perhaps the most marked and characteristic symptom is the total loss of appetite, and oftentimes with inability to digest solid food. It becomes a matter, sometimes, of astonishment at the persistence of this inability to digest solid food, and the small amount of nutriment that the individual takes, the ordinary avocation being pursued under the fatal influence of the dram, which is slowly poisoning the organism.

This irritable state of the stomach, with frequent retching, and even vomiting after food, is followed at longer or shorter intervals by attacks of hæmatemesis; this, although a frequent, is by no means an invariable precursor of the ascites. Associated with these symptoms we now often may obtain evidence more directly implicating the liver; the region of the liver, as indicated by percussion, exceeds its natural limits; there may be some tenderness felt at its anterior margin. The epigastric region becomes full and prominent and sensitive to the touch, and the patient is unable to recline on the left side, from a dragging, uneasy, and painful sensation, which remains so long as he lies in that position. The urine now becomes scanty, sedimentitious, and the urates are stained of a bright pink colour from the presence of purpurine, an oxidised product of uric acid. Jaundice is not always, though often, an accompaniment of the early stages. Slowly and insidiously the belly grows larger; fluctuation, at first obscure, now becomes the characteristic sign of water in the abdominal cavity, and the patient, no longer able to engage in his ordinary pursuits, seeks medical aid. In many the increasing enlargement of the belly is often mistaken at first for increasing obesity, and the waistband of the clothes is enlarged under this erroneous impression.

It may readily be supposed, from the defective state of the digestive organs, from the irritable stomach, and the scanty amount of solid food taken even for weeks, that loss of flesh would actually follow. I know no more painful contrast than between the tumid and protuberant belly and the attenuated arms and emaciated trunk; and if there be anasarca of the lower extremities, the contrast is the more forcible. According to the duration of the ascites, and as a comparative measure of the degree of obstruction in the portal vessels of the liver, there will be apparent, on the surface of the belly, many enlarged veins, running up from the groin on each side, and mixing with some which appear to meet them from beneath the mammary region of each side.

The greater and longer enduring has been the obstruction in the portal circulation, the more manifest will be this circuitous route by which a small portion of blood from the abdominal vessels finds its way to the cava without traversing the liver. Again, it is not till the pressure of the fluid in the abdominal cavity has reached a point sufficient to impede the circulation through the iliacs that anasarca of the lower extremities makes its appearance; so that this inosculation of the epigastric and mammary veins and the anasarca of the lower extremities may be accepted as signs of some meaning, and implying a more serious amount of liver disease than would be inferred if they were absent.

Long before this stage has been reached the scanty urine, the disordered digestion, and the sluggish and torpid bowels, are the most prominent attendant symptoms. The scanty urine, with its excess of lithates, evidently arises from the defective circulation through the kidneys, partly produced by the pressure of the accumulated fluids and partly by the embarrassment of the circulation through the inferior cava. It might, at first sight, be thought desirable to endeavour to increase the activity of the kidneys, and, by diuretics, encourage a gentle flow of urine; but diuretics at this juncture are useless, the kidneys are incapable of increased activity so long as the circulation through them is embarrassed from the above causes. There is no hope of this action until the pressure of the abdominal fluid is reduced. There are but two channels through which this can be effected—by drastic or hydragogue purgatives, or by tapping, the operation of paracentesis abdominis. The relative importance of these must now be considered.

The best hydragogue purgatives are jalap and cream of tartar, elaterium, or podophyllin.

The bowels should be regulated, and a free action obtained daily by means of some mercurial alterative in conjunction with a resinous purgative, if the sluggish bowels require such aid. So soon as the epigastric tenderness has abated, and with it the irritable state of the stomach, then means should be taken to increase its weakened powers. There are many stomachic tonics in the Pharmacopœia, but there are not many adapted to this stage of the disease. Ipecacuanha, in small half-grain doses, taken before breakfast, and repeated before dinner, will give vigour and energy to the primary stage of digestion, and induce the secretion of a more healthy gastric acid. It is not my purpose to enter into any detail of the management of these cases of hepatic disorder previous to the development of dropsy, beyond what has been already stated; I merely desire to establish the fact that the timely treatment of these conditions of the liver which precede the outpouring of fluid promises, with an approach almost to certainty, to avert the formidable and often unmanageable sequel.

The treatment of the early stage of liver disease, leading to ascites, has been sufficiently indicated in the preceding cases. It is hardly necessary to add that a radical change in the habits of the individual must be enforced and maintained before any permanent benefit can be expected by medicinal means.

If, after the employment of all reasonable measures, the dropsy is found still to increase, and if the urinary and respiratory functions are beginning to suffer, the sole remaining source of relief is by tapping. This operation will often, for a time, set free these embarrassed organs, and a more abundant secretion of urine, and a freer respiration indicate the relief obtained. Advantage should immediately be taken to excite diuretic action, and the combined influence of the several therapeutic agents possessing this power should be tried. A combination of the iodide of potassium with cream of tartar is often very active in increasing the flow of urine, and the addition of digitalis sometimes increases this diuretic property.

## SUMMARY OF TREATMENT OF HEPATIC DROPSY.

Abstinence from all spirituous liquors is an imperative preliminary.

In the early stage of engorgement, congestion of the liver, or any condition approaching to inflammation of the organ, local abstraction of blood by leeches or cupping, blistering to the epigastrium or leeches to that region, and brisk action on the intestinal canal by mercurials and resinous purgatives—senna and the potassio-tartrate of soda—sulphate of potash and rhubarb—even small doses of podophyllin—may be beneficially used. A strictly regulated diet till the irritable stomach can bear ordinary food.

In the second stage, with indications of fluid in the belly, the same measures, with mercurial alteratives, cream-of-tartar purgatives, and, if the urine be not loaded with pink lithates, the cream of tartar and iodide of potassium as a diuretic, the hydrochlorate of ammonia and taraxacum.

In the third stage, with tense abdominal walls, enlarged epigastric veins, and anasarca of the lower extremities, hydragogue purgatives must be tried; podophyllin in larger and more frequently repeated doses, calomel in large doses, ten to fifteen grains, with an equal quantity of the sesquicarbonate of soda, may be given with advantage, care being taken that it be not repeated except at an interval of days. For diuretics, the iodide of potassium and cream of tartar as before mentioned, with digitalis, the acetate of potash and squill in combination. As an alterative in this stage, the hydrochlorate of ammonia may sometimes be employed with benefit. The last resource, as before mentioned, is the operation of paracentesis abdominis, and the indications for its necessity have already been described.

# PART III.

## DISEASES OF THE KIDNEY WITHOUT DROPSY.

## URINE ALBUMINOUS, SANGUINOLENT, OR PURULENT.

# PART III.

## DISEASES OF THE KIDNEY WITHOUT DROPSY.

## ALBUMINOUS, SANGUINOLENT, AND PURULENT URINE, UNCONNECTED WITH BRIGHT'S DISEASE.

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## CHAPTER I.

### TEMPORARY ALBUMINURIA.—INTERMITTENT HÆMATURIA.—ENDEMIC HÆMATURIA.

It has been already shown that albuminous urine, with a peculiar and characteristic sediment, is significant of a special form of disease of the kidneys. But the urine may be albuminous, may be sanguinolent, may be purulent, and yet not symptomatic of morbus Brightii; for these states of the urine, apart from the tube-casts, are common to many disorders of the renal organs. In the one case a greater or lesser amount of general dropsy is always present; in the other, these morbid conditions of the urine are independent of any such symptom.

I propose to illustrate by a few typical cases these albuminous, sanguinolent, or purulent states of the urine, unconnected with morbus Brightii.

The diseases in which albumen appears temporarily in the urine have been already enumerated. It may be convenient to repeat them.

In pneumonia, albumen in small quantities is found in the urine, apparently having some connection with the disappearance of the chlorides; for, as they diminish or disappear from the urine, albumen in small amount may usually be detected. As the chlorides reappear, the albumen is no longer present.

In pleurisy, as well as in pericarditis and peritonitis, albumen has occasionally, but by no means constantly, been detected in the urine. So also in erysipelas it has occasionally been found. In typhus and typhoid fevers, in variola and in measles, albumen has frequently been found present. Its presence in the secondary febrile disturbance of scarlatina has already been noticed. In the reactionary stage of cholera, the urine first passed always contains albumen. The urine found in the bladder after death is, I believe, universally albuminous; this may be a post-mortem effect from passive transudation of serum.

In phthisis the urine is occasionally albuminous, but it has already been shown that this arises from true degeneration of the renal structures and the development of one form of morbus Brightii.

No satisfactory explanation of the cause of the urine becoming temporarily albuminous in the above-named diseases has hitherto been offered. It is a functional disturbance, depending, in all probability, on diffuse capillary blood stasis, by which the functions of all organs are more or less impeded or deranged, a condition common to all fevers and inflammations.

M. Robin's statement, read before the Academy of Medicine in Paris in 1851, accounting for the presence of albumen in the urine by the theory that, in health, albumen is an excrementitious product in the blood, and that it is decomposed in the process of respiration, and the nitrogenized residue of this combustion, urea and uric acid, are excreted by the kidneys, has been already quoted (p. 22), and my objections to this theory stated; and I repeat that in erysipelas, typhus, and typhoid fevers, cholera, variola, and measles, albumen is occasionally present; but in these febrile diseases there is not that disturbance to the process of respiration which could justify the admission of M. Robin's theory to account for the presence of albumen. While in emphysema, in cyanosis from patent foramen ovale, in mitral disease of the heart, in each of which the respiratory function is but imperfectly performed, albumen appears in the urine as the result of mechanical impediment to the circulation through the kidneys from accumulation of blood in the right side of the heart. (See pp. 266-7.) Albumen is not present in the urine in every case of phthisis. When it is, a microscopic examination will prove that organic changes have already commenced in the cell-structure of the renal tubes.

At present, then, we must be content to accept the fact, without being able to solve the cause, that albumen is temporarily present in the urine in certain febrile and inflammatory diseases; and that being unaccompanied by dropsy, or any exudation from the uriniferous tubes, it may be regarded as a functional disturbance of the renal excretion, unconnected with any organic change of structure, of little importance as a symptom, and which will disappear with the disease with which it has been associated. But while we may regard albumen in the urine in these diseases as in no way significant of structural disease of the kidneys, yet it is far otherwise with the appearance of blood or pus in this excretion.

### TEMPORARY ALBUMINURIA.

In discussing the origin and cause of albumen in the urine (p. 21), it was incidentally mentioned that it has been found in the urine, even in health, after the ingestion, or rather imperfect digestion of some albuminous substances; and further observation goes to prove that various and apparently very opposite disturbing causes, seem capable of inducing the presence of albumen in the urine.

The most prominent of these are—

1. Certain indigestible articles of food such as in some persons produce marked symptoms of indigestion, as some

kinds of cheese, shell-fish, crabs, cockles, mussels, &c. The dyspepsia is often associated with cutaneous eruptions of the nettle-rash type, and albumen in the urine. This disappears with the cutaneous and gastric disturbance.

### TEMPORARY ALBUMINURIA FROM NERVOUS EXCITEMENT.

Certain mental emotions disturbing the equilibrium of the nervous system, and operating powerfully on the ganglionic portion, seem competent to produce temporary albuminuria, which may be illustrated by the following case.

A young gentleman just of age, formerly a pupil of mine, suffered great mental anxiety about his examination at the College of Surgeons. For a few weeks there had been great sleeplessness, restlessness, and loss of appetite. These were accompanied by such frequent micturition, that in his anxiety he examined his water, and to his further distress found it albuminous. My examination of it confirmed the fact. There were a few mucous corpuscles, crystals of uric acid, but no casts. He passed his examination very creditably. The next morning the urine was still slightly albuminous. He was advised to take some relaxation in the country. In a fortnight he wrote to say the water was quite natural and his health perfect. This occurred in 1862, and he has enjoyed uninterrupted health since.

### TEMPORARY ALBUMINURIA IN CERTAIN DISORDERS OF THE SKIN.

In some affections of the skin connected with more or less gastric disturbance, the urine becomes temporarily albuminous. The following very interesting case illustrates this exceptional state, and will suggest a warning that the presence of albumen in the urine is not necessarily indicative of organic disease of the kidneys.

I am indebted to Mr. Frederick Clowes, of Windermere, for the early history of this singular example.

Case XXXIV.—H. T—, æt. 35, a clergyman. "Slight hereditary predisposition to gout, rather tall and well formed. As a boy, fat and hearty; but sent home from school at 17 on account of headaches. Got quite strong at home, leading an active outdoor life, up to 24. At that time quite well, about eleven stone in weight, very strong and athletic, could jump a bar five feet six inches. Went to Edinburgh to attend lectures; completely altered his habits, gave up exercise almost entirely. He fell off in strength, muscles became soft, but still had tolerable health, excepting slight dyspepsia and want of nervous energy. In this state he continued for above seven years, taking little medicine, except to overcome habitual constipation."

"For the next three years he was at Durham University, and studied hard eight hours a day (having read little for a few years)."

"The digestion became much disordered, even with great care in diet; troublesome constipation, muscæ volitantes, acidity, and could take no wine. He lost more than a stone in weight. Took mild alteratives and alkaline tonics, with more or less benefit."

"For the last year he has been curate of this place, with moderate work. *Present symptoms.*—Of fair average strength; pulse about sixty-two, compressible, and rather weak; complexion pale (formerly fresh coloured); has lost about eight pounds weight in the last year. More easily tired than he should be, otherwise not complaining of any symptom but general want of energy, and want of digestive power; but the appetite good. Beer causes dulness, and he can take little alcohol in any shape. Two thirds of his time he feels a dulness of intellect quite unnatural to him, so that he cannot exercise his reasoning powers. This he has had more or less for the last three years. Six weeks ago he had severe neuralgia on both sides of his face for above three weeks. If he gets a chill this is apt to return. For the last two years, every now and then, the lips and face especially, but almost every part of the surface, will become swollen, red, and itching, subsiding again in an hour or so. No permanent deposit above any joint, nor in the cartilage of the ear; but he says there certainly *was* a deposit in the lobe for years. Now very subject to chilblain, which previously he never suffered from.

I first saw this gentleman in February, 1860. A clergyman of healthy aspect, tall and vigorous. The chest was well formed, the heart's action natural. The tongue was pale, and coated with a creamy fur, and enlarged papillæ. Bowels ordinarily costive, dejections indurated and scybalous; appetite good; never had gout or rheumatism. Spots frequently appear on the skin, isolated, commencing with intense itching; they swell up almost to the size of a pigeon's egg, become very red, and in half an hour or more disappear without any exfoliation of the cuticle. From his description, these spots present the characters of urticaria. The symptom which engages this gentleman's attention most is an apprehension of mental deficiency, showing itself in a want of power to concentrate the attention, or to fix it on any single train of thought.

The urine passed in the morning was clear, had an acid reaction, &c.; sp. gr. 1015; a granular and pretty abundant deposit was formed by heat and nitric acid. Slight excess of uric acid, but no other morbid condition was observed. The urine set at rest threw down a faint sediment, not more than is usually seen in healthy urine. No epithelium of any kind, except urethral, was seen. No exudation corpuscles; a few granular collections of amorphous urate of ammonia, which to the inexperienced may sometimes be mistaken for granular casts, as they are often arranged in apparently a linear or even tubular form. On February the 16th I further examined two other samples of urine. Both were cloudy from presence of urates. Temperature of the air 38° F. Both cleared by heat, and subsequently coagulated with a pretty abundant deposit of albumen. After a patient search of more than an hour, one or two epithelial cells from the pelvis of the kidney, and a solitary cast, faintly granular, containing an exudation corpuscle. I had great difficulty in convincing myself that this was a cast.

He remained in London a week, and after taking quinine and some alterative purgatives, the urine passed before leaving town was examined, and was found to be loaded with uric acid. The sediment consisting entirely of columnar, barrel-shaped crystals. The faintest trace of albumen was present, and no casts visible. The opinion I formed at this time was, that this albuminous state of the urine depended on some depressed state of the system, and that by generous diet and tonic remedies, and cheerful habits of life, a restoration to health might be expected. A specific regimen was written down for his guidance.

Six months afterwards he again visited London. The urine now contained but the faintest trace of albumen, but was highly charged with uric acid. His general condition was much improved. His spirits better; but the spots on the skin continued to trouble him, and he had lately learnt to associate these eruptions with an attack of dyspeptic symptoms, and lowness of mental activity. He had increased in weight; he could walk eight or ten miles without fatigue; the bowels were no longer torpid, but acted spontaneously. I detected a faint hyaline cast in a sample which was now examined. I began to think from the hereditary taint of gout in his family, and from the statement that he had a deposit of urate of soda in the cartilage of the ear, but which had disappeared, that his case might be one of the early stage of the gouty kidney. But there were wanting all the concomitant and diagnostic symptoms of such a disease. No renal irritation; no frequency of micturition; no sympathetic state. I had an opportunity, on his present visit to London, to witness the character of the cutaneous symptom which so often troubled him, and it was quite evident that he had for a long time suffered from intermitting attacks of urticaria evanida; for those on the arms were unmistakeable examples of that eruption. In March, 1861, the urine began to assume some very anomalous characters, exhibiting the phenomena of coagulation by heat and nitric acid; but if the sample was previously acidulated with acetic acid, no precipitate could be obtained by boiling. If a few drops of nitric acid were added, a turbidity ensued, but the whole became clear on the application of heat; but, on cooling an hour afterwards, numerous crystals of uric acid had deposited themselves. He was now recommended to take Donovan's solution of the iodide of arsenic and mercury, and for a laxative the Rochelle salt. Last July I again had an opportunity of examining some samples of the urine. The morning urine was pale and clear. Sp. gr. 1·016. Acid reaction. By boiling a faint cloud was produced, which was dissolved by nitric acid, remaining clear till cold, when a reddish sediment formed of uric acid. The evening sample behaved in a similar manner. There could be no doubt that the albuminuria had disappeared, and had been replaced by a secretion abounding in uric acid. The eruption of urticaria had disappeared for a time; but returned again at intervals during the summer; and with it the clouded and dull state of the faculties. He enjoys a fair share of bodily activity, and the general health and digestive powers he describes as very much improved compared with last year. I have every reason to think that this temporary albuminuria originated in imperfect assimilation, and was also intimately connected with some defective state of the cutaneous function. A satisfactory explanation of this state of temporary albuminuria is confessedly difficult. It would serve no useful purpose to hazard what would be either conjectural or theoretical. Let the plain fact, that albumen may appear in the urine, independent of and unconnected with organic disease of the kidney, have its practical value; and teach us that the presence of albumen in the urine in connection with cutaneous disorder and gastric derangement is a morbid phenomena, which need neither be unexpected, nor considered serious.

## TEMPORARY HÆMATURIA.

### *Hæmaturia from mental disturbances.*

The appearance of blood in the urine is always a source of anxiety and alarm to the patient, and if not rightly interpreted may become a source of serious error in treatment. Its importance as a symptom must depend on the part of the urinary apparatus from which it is derived. Its significance, even when coming from the kidneys, is momentous or otherwise, according to the character of the accompanying symptoms. It may indicate temporary conditions of disease, to be easily removed by judicious measures; or it may afford unequivocal evidence of incurable organic mischief. Hæmaturia may occur in the course of many different diseases. It may be symptomatic of various diseases of the kidney: 1. Simple inflammation or nephritis. 2. The early stage of Bright's disease, particularly scarlatinal dropsy. 3. Calculous pyelitis, including under this form gouty inflammation. 4. Tubercular pyelitis. 5. Cancer of the kidney. Or the hæmorrhage, proceeding from the kidneys, may not imply any organic disease of these organs, being symptomatic only of a general hæmorrhagic condition, in which the kidneys participate with other organs; such is the hæmaturia in purpura and scurvy. It occurs also in some febrile disorders, as variola and typhus, and it is sometimes prevalent in pyæmia. Moreover, the blood may be derived from the bladder, prostate, or urethra, quite independent of the kidneys. Again, hæmaturia has been noticed, occasionally occurring in women, as vicarious of the menstrual flux, an example of which was lately under Mr. Guthrie, in Percy ward, in a woman suffering from abscess in the mamma. In this case the catamenia had been absent during the previous three months; but for several consecutive days at the menstrual period, blood was passed with the urine. There was no increased frequency of micturition, nor any pain or irritability about the urinary passages. The urine, examined under the microscope, presented blood-discs, amorphous fibrine highly stained with hæmatine, and a few epithelial cells, apparently from the pelvis of the kidney and ureters. Rayer mentions instances of this vicarious hæmaturia.

There is yet another form of hæmaturia, which appears to be unconnected with any of the preceding morbid conditions, and the only exciting cause which can be detected is mental agitation. If, in particular constitutions, there be this singular idiosyncrasy, that mental inquietude or excitement can bring on attacks of hæmaturia, temporary in their duration, innocent in their sequel, and unconnected with organic mischief in the kidney, it must be manifestly of importance to ascertain if possible the symptoms by which such an exceptionable and rare form of hæmaturia can be distinguished from the more serious cases arising from calculous or other organic disease.

Case XXXV.—The case of Edward B—, in Burdett ward, appears to me to illustrate this rare form of hæmaturia, the recurrence of the attack being invariably connected with mental disquietude. He was a shoemaker, forty-three years of age, of spare habit of body. He stated that he was a teetotaller, and had been so for years; that about nine years since he first noticed his urine discoloured with blood; its appearance was unaccompanied by any pain or constitutional disturbance; it alarmed him, and he sought advice. He was ordered change of air, and cessation from his very sedentary employment. He stated that he was relieved for the time, but that three years afterwards he suffered another attack. On that occasion, he recollected that it was preceded by a sense of weight and pain in the loins. He was treated at Charing-cross hospital, and on subsequent occasions at other hospitals, always with relief; the continuance of the blood in his urine seldom exceeding ten or fourteen days. During the last twelve months the hæmaturia had become more frequent, and he has had two attacks in the course of the last six months. On admission he complained of pain in the loins, and the urine was highly charged with blood. He was free from all other symptoms of disease: the chest was natural; heart-sounds natural; the abdomen was flat, soft, and elastic; there was no fulness in the lumbar spaces, and no tenderness on deep-made pressure; the region of the liver did not exceed its natural limits. The appetite was good, the tongue clean; the bowels natural. Micturition was not more frequent than natural, nor was there any difficulty or pain. The urine was of a dark-red colour, but was free from visible clots; allowed to rest, it deposited abundance of blood-discs. He was ordered to be cupped to ten ounces from the loins; to take five grains of gallic acid every four hours, and half a drachm of the compound jalap powder every alternate morning, and a warm bath each alternate evening. The urine was examined by the microscope; numerous blood-corpuscles were visible, and many fibrinous casts entangling blood-discs in their substance. These fibrinous coagula had the appearance of having been moulded in the uriniferous tubes, and washed therefrom by the escape of the urine; their size suggested their formation in the straight tubes of Bellini. Ten days after admission, the urine was quite free from all vestiges of blood to the unassisted eye; it presented a faint albuminous cloud by heat and nitric acid, and, allowed to rest, it deposited a flocculent precipitate, which, by the microscope, was resolved into amorphous fibrinous masses, slightly stained with hæmatin; a few blood-discs were seen, but no other microscopic objects. The patient was free from all traces of lumbar pain, and he thought that his bodily strength was increasing. Three weeks after admission he presented the same favorable condition: no trace of blood or albumen in the urine; the same flocculent deposit of minute amorphous coagula stained with hæmatin; but no casts of the tubes, nor any blood-discs. The medicines were discontinued. On the fifth week of admission he complained of a return of the lumbar pain, but there was no alteration in the natural appearance of the urine, except that crystals of oxalate of lime were observed interspersed amongst the minute amorphous coagula above noticed. He was discharged in the month of August, 1855, and from time to time he has attended to report his freedom from any return of hæmaturia; but at the last visit he complained of great increase of pain in the left lumbar region, extending upwards to the shoulder of the same side. In October he brought a sample of his urine, and it was again blood-red, and possessed the same characters as when it was first examined; but it was unaccompanied by any constitutional disturbance, and he stated that he had no difficulty in passing his urine, nor was there any undue frequency of micturition, nor any local symptoms different from those when an in-patient. He added an important fact: that these recurrences of bloody urine were always caused by some vexatious mental excitement. The man, it appears, was quiet, sober and industrious, and, upon principle, totally abstained from all fermented drinks. His wife had no liking for water, but possessed the common prejudice in favour of alcohol, and, whenever she could command the means, indulged to excess; her demeanour towards her husband at these times was somewhat at variance with her marriage vows, and, to avoid annoyance, the patient stated that he had endeavoured to effect a voluntary separation; that while he was left to himself undisturbed, his malady disappeared; but the moment he was subjected to visits from an inebriated woman, the hæmaturia instantly returned. He had noticed this sequence to be so uniform, that he firmly believed that the vexation and trouble to which he was occasionally exposed were the sole causes of his disease. I am inclined to think the man's inference not so far wrong or unintelligible as it might at first be considered. It may be readily granted that neither anatomically nor physiologically is the connection between renal hæmorrhage and mental emotion very apparent. It is true, that certain mental emotions are known to excite, more or less, the renal function; but the cases are extremely rare in which a morbid state like hæmorrhage can be traced to a similar exciting cause.

The records of medicine, however, are not without such cases. Rayer, in his work 'Maladies des Reins,' in treating of renal hæmorrhage, mentions a case of hæmaturia (tome iii, p. 359), brought on apparently by no other cause than mental excitement: "survenu presque immédiatement après un violent accés de colére." The accompanying symptoms were severe hypogastric pain, with heat and pain in the course of the ureters; and sensation of weight and aching in the region of the kidneys. He was quickly relieved by rest, warm baths, diet, and mucilaginous drinks. I saw a gentleman last spring, seventy years of age, who suffered from occasional attacks of hæmaturia, traceable to no other cause than mental excitement. There were no gouty symptoms or the least tendency thereto. He was a remarkably healthy, vigorous country gentleman. He consulted the most distinguished physician of our day, whose name is inseparably connected with renal pathology, and his opinion, the patient informed me, was in conformity with the views now expressed.

This man, B—, had several times, since he first came under my notice, presented himself with a return of his complaint. The hæmaturia, in June, 1856, lasted only three days. On the fifth day the urine was free from all trace of blood or albumen. Trouble and excitement preceded the attack. Six weeks afterwards he had another attack; and so dependent does the hæmaturia appear to be on mental excitement, that on this occasion a trivial dispute with his employer about the scale of remuneration for work was the exciting cause. On each of these attacks the symptoms exhibited the same peculiarity; a sense of weight and pain about the loins, but unaccompanied by any constitutional disturbance, by greater frequency of micturition, or inconvenience or difficulty in that act. It was thus, by the exclusion of all the symptoms of irritation characteristic of renal calculus, or of gouty inflammation; it was by the absence of all constitutional disturbance, whether febrile or dropsical; it was from the temporary character of the attack, the urine in a few days becoming free from blood, and from all morbid sediment, except a few scattered blood-discs, that we were led to exclude as the cause of the hæmaturia all those organic diseases in which hæmorrhage occurs as a prominent and leading symptom, and to attribute the hæmaturia to the operation of mental excitement.

I confess that but for the authority of such an observer as Rayer, or the support which this view received from the opinion of the eminent physician quoted above, that I had great difficulty in forming a satisfactory diagnosis of the cause of the hæmaturia. It was only by a patient observation of the sum of the symptoms exhibited by this patient over a period of more than eighteen months, and finding on each recurrence of the attack the strictly temporary state of the urine, the constant relation of this hæmorrhage to mental emotion, that I at last came to the conclusion that the case might be fairly classed with those which Rayer has mentioned as 'hæmorragies renales essentielles' (sporadique), and that the exciting cause of the hæmaturia must be attributed to the rare and exceptional influence of mental excitement. I have been very desirous of keeping this patient under observation, with a view of testing the soundness of the opinion entertained up to this date.

This patient came again under my observation in May, 1857. He stated that it was more than six months since he last suffered an attack of hæmaturia; that during that period he had experienced many things to fret and worry him—quarrels with his wife, his brother gone to a mad-house; but, strange to say, these anxieties did not affect him so as to bring on bloody urine, as formerly.

The present attack was of three days' duration; and he stated that, for the first time, he felt some weight and uneasiness across the loins, with a settled fixed pain in the left hip, extending to the position of the anterior crest of the hip-bone. There was no numbness or pain in the leg, no retraction of the testicle, no frequency of micturition; he held his water through the night. The tongue was clean, appetite unimpaired, and the general health undisturbed; aspect of the patient healthy.

The urine was blood-coloured, albuminous, not deficient in quantity.

Under the microscope nothing but scattered blood-discs could be discovered.

On May the 18th, the urine had nearly lost its cherry tinge. The pain in the loins had abated. He derived apparently much benefit, so far as the subsidence of the hæmaturia, from the sesquichloride of iron.

During the summer and autumn he suffered several attacks, each passing off in three to four days, the urine becoming, he states, quite healthy in appearance. I have not, hitherto, been able to get the man to bring his urine for examination in these intervals of calm. On the 3rd of December he stated to me that now the urine becomes mixed with blood after much bodily exertion; and that when the urine is not bloody, it is turbid—

he said, milky—and throws down a sediment. On the 4th of December, he brought me some urine passed that morning. It was slightly turbid, a flocculent cloud was thrown down by subsidence, the clear portion was doubtfully hazy by heat and nitric acid. The sediment, when examined, was composed of pelvic epithelium, large, compound granule-cells, the smaller sized exudation-corpuscles (mucous pus-corpuscles), and a very abundant formation of oxalate of lime crystals (octohedra). I have rarely found them in greater abundance. (Pl. X, fig. 11.) The patient distinctly stated that the only inconvenience he felt was the pain in his loins, but not one sympathetic symptom, usually present in renal calculus, could be detected. The presence, however, of these inflammatory corpuscles in the urine is evidence of some irritation in the kidneys, and the hæmaturia may hereafter be traced to some local source of mischief; but if this should ultimately be proved, the case presents very exceptional features. For more than two years the hæmaturia has been unaccompanied by any sympathetic symptoms, or by the slightest derangement of the health. Even now the aspect of the patient is most favorable; his looks are healthy, active, and undisturbed, and the lumbar pain passes away so soon as the blood disappears from the urine.

## TEMPORARY AND INTERMITTING HÆMATURIA.

The above case might almost be classified under this head. There are, however, cases, recently recorded by Dr. Harley,* in which the hæmorrhage seemed in some to be traced to the effect of exposure to cold, in others to arise from the agency of a material poison.

Further observation is desirable on the sequel to these cases, as it may not be improbable that what at first seemed but a temporary and functional disturbance, eventually may terminate in organic disease.

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* 'Med.-Chir. Trans.,' vol. xlviii, p. 161 et seq.

## ENDEMIC HÆMATURIA.

Attention has been recently directed to the prevalence of hæmaturia occurring to numerous individuals in certain localities, particularly at the Cape of Good Hope and in Egypt. It appears to be a symptom limited and indigenous to hot countries, and to arise from the ravages of a parasitic entozoa of the genus Distomum. It was discovered and first described by Dr. Bilharz, in Egypt, and out of compliment to him the parasite is now called the *Bilharzia Hæmatobia.*

A very interesting paper on this subject was communicated by Dr. John Harley to the Royal Medical and Chirurgical Society, and published in the 'Transactions,' for 1864 (vol. xlvii, p. 55). Dr. Roberts, in his work on "Urinary and Renal Diseases," also notices the disease. I have never met with an example; the reader is therefore referred to these works.

## CHAPTER II.

### URIC ACID IN EXCESS—GRAVEL OR RED SAND.

Before describing the more serious and fatal forms of kidney disease which are developed by the gouty habit, it may be convenient to notice some of the conditions of the urine which are the usual precursors of the atrophied kidney, and which are —up to a certain stage—readily amenable to treatment.

*Gravel or red sand from excess of uric acid, often inducing obscure symptoms of pyelitis, even hæmaturia and albuminous urine.*

Urine containing excess of uric acid, which is rapidly and abundantly precipitated on cooling—in any of the crystalline forms which this acid assumes—will sometimes excite so great a degree of renal irritation, that grave doubts may be entertained whether the patient is not suffering from calculous nephritis. These doubts a microscopic examination of the urine will satisfactorily remove. The uric acid crystallizes from the urine so abundantly in these cases, that a deposit of what is called *red sand*, rapidly forms at the bottom and sides of the vessel, and is always accompanied by epithelium in abundance from all the urinary passages. Such urine therefore affords examples of epithelial cells from the bladder, ureters, and pelvis of the kidney. Epithelium from the tubuli uriniferi do not occur. When the amount of renal irritation is very great, large compound granule-cells are not unfrequent, and in very severe cases, where the symptoms differ in nothing but in intensity and duration from those of calculous nephritis, a few scattered pus-cells and granule-cells usually accompanying pus, may for a time be visible. But these soon disappear, and the urine contains only healthy formed epithelium in daily diminishing proportion; and this, as the uric acid decreases, becomes no greater in amount than in healthy urine. The symptoms, in these cases, differ very much in intensity, even in character. Sometimes lumbar pain, with slight amount of irritation in the urinary passages, and dyspeptic derangements, are the chief signs. But not unfrequently the symptoms become more directly expressive of renal irritation. These are, frequency of micturition, heavy, pungent, pains in the loins, extending to the neck of the bladder, and even to the extremity of the urethra. A steady, fixed pain may localise itself in the crest of the ilium, and there may be even pain extending down the thigh. Such cases may terminate in calculous nephritis; but, by judicious treatment, this grave disease may be averted. The gouty habit of body is that which is most commonly disposed to such attacks; but the disorder may result from the sudden arrest of the cutaneous functions, accompanied by febrile disturbance. These cases readily yield to treatment, warm baths, diaphoretics, and alkaline citrates. An attack of gravel, in the gouty habit of body, should always be viewed as salutary; for it is an effort, and a successful effort, to eliminate by the urine the *materies morbi* of the gouty diathesis. But an attack of gravel may occur in individuals in whom the gouty disposition is not strongly pronounced, and its origin may be traced to the special influence of certain articles of food, but more particularly of drink. Cyder, to those unaccustomed to it, will produce excess of uric acid, or at any rate will so acidify the urine as to cause the ready precipitation, on cooling, of these crystals. Home-made wine, new and half-fermented beer, abundance of acid fruits, will severally, in certain constitutions, lead to similar results. As age advances the disposition to the formation of uric acid in excess increases, and the influence of any of these exciting causes is still more readily felt.

### GRAVEL AND ITS REMEDIES.

CASE XXXVI.—A lady, sixty-six years of age, of healthy aspect, resident in the country, married, and the mother of a grown-up family, had for two or three years suffered from distressing frequency of micturition, being obliged to rise as many as five or six times during the night, accompanied with constant lumbar pain, and a distressing pungent feeling extending downwards in the direction of the ureter to the neck of the bladder. These painful sensations increased in intensity till she passed a small quantity of water, when temporary relief was obtained. All these symptoms were present when I saw her. She stated that she had more than once seen what she conceived to have been blood in her water.

The pain was referred chiefly to the left lumbar region, and extended downwards towards the bladder. There was also a fixed sense of uneasiness rather than of pain at the crest of the ilium, and proceeding in the direction of the external crural cutaneous nerve. There was a sense of numbness in the exterior half of the thigh of the left side. She had frequently, during the last few years, suffered from what appeared to have been true gastralgia—*heartburn;* but at the present time the digestive organs did not appear out of order. She suffered no increase of pain in walking, nor did the jarring or jolting of a carriage in any way augment the pain in the loins. She had frequently noticed great quantities of red sand in the water. All the other functions seemed healthy. There was no history of gout in the family, nor were there any gouty indications, except the character of the dyspeptic symptoms.

The urine which was brought for examination was of a bright orange colour, of a strong acid reaction, of a specific gravity of 1·021: it threw down a plentiful flocculent cloud, occupying about one third of the tube in which it was set at rest: and the sides were coated with numerous crystalline grains of uric acid. Microscopical examination exhibited numerous crystals of uric acid; some lozenge-shaped; some columnar, or cylindrical, together with large fields of the pavement variety of epithelium studded with lozenge-shaped crystals of uric acid. (Pl. X, fig. 6.) There were also groups of epithelial cells from the pelvis of the kidney, and a few scattered compound granule-cells, and one or two isolated ones looking like pus-cells, or exudation-corpuscles. In each drop of urine examined the crystals of urid acid were more numerous than the organic structures.

I could not trace this excess of uric acid to any satisfactory cause. That it had given rise to the symptoms of renal irritation above described, there could be little doubt.

The patient had constantly resided in the country; enjoyed uninterrupted good health, and had lived throughout her life in the same locality.

Her husband was engaged in agriculture, while she superintended the domestic affairs of the farm. Her diet and mode of life were not different from those enjoyed by the rural gentry. The son told me they brewed their own beer, and his mother was very fond of it both new, and in the half-fermented state. This was the only dietetic error to which the malady could be attributed.

The bicarbonate of potass, in half drachm doses, with a dessert-spoonful of lemon-juice, were taken three times a day, and an anodyne draught at bed-time.

Two days after a second examination of the urine was made; the appearances did not materially differ from those seen on the first occasion. The flocculent deposit was much less, the epithelium diminished, and only here and there was seen a large compound granule-cell. The decrease in the number of these was accepted as a sign that inflammatory conditions were subsiding rather than increasing. A fortnight afterwards the urine that was sent up was free from any deposit of uric acid, and the only structures visible were a few groups of the pavement epithelium of the bladder, and a few scattered and isolated cells, from the urethra. The frequency of micturition had disappeared; the distressing lumbar pain was mitigated; and by the end of a month I was informed of her freedom from any of the preceding symptoms.

In cases of gravel as distinguished from calculous pyelitis, the presence of the normal epithelial cells of the pelvis of the kidney and ureters may always be considered favorable, since they indicate that suppurative action has not commenced.

Urine carrying a maximum quantity of uric acid in solution, up to the point as it were of saturation, is, of itself, a source of disturbance, as is shown by the frequent desire to pass water, amounting sometimes to a very distressing form of irritation.

Urine so constituted, even within the body before leaving the pelvis of the kidney, on being discharged from the bladder will yield up these crystals in the form of so-called gravel or red sand. The vessel into which the urine has been passed exhibits an abundant sediment of red crystalline grains, not unlike cayenne pepper. In other cases the uric acid is not deposited till after the urine has been voided. In either instance the result may be the same: great urinary irritation, and a disposition, more or less certain, to the formation of stone in the kidney.

In some patients this appearance of uric acid in excess occurs in the intervals of attacks of gout, and marks the presence in the system of the essential element of that disease, and the efforts the renal organs make to eliminate it from the body. If gout does not follow this predominance of uric acid, the kidneys and urinary organs may suffer in proportion: and the urine may exhibit unequivocal proofs of the disturbance the kidneys are suffering, as the previous case illustrates. The remedy for this redundancy of one of the most important of the excrementitious products is as simple as it is efficacious. A potash salt in combination with an organic acid, taken three times a day, first aids to keep the uric acid in a state of solution, with a decreasing disposition to crystallize from the urine and then, by inducing a more abundant flow of urine, it washes out, as it were, the straight uniferous tubes, and prevents the retention of any isolated grains, which, if retained, would certainly become the nucleus for future mischief.

For chemical proof of the action of potash salts, or uric acid and its compound, I must refer to Dr. Roberts' work on the urine and urinary diseases. Clinically the fact has been long known, and in earlier editions of this work, the employment of these salts for this purpose was specially enforced.

I cannot, however, refrain from making known the peculiar activity, and valuable remedial effect of a combination of potash and the citrate of lithia, which I have employed for the last two or three years in those forms of renal disease arising either from gravel or stone in the kidney.

The mode of administration is simple and palateable. Half a grain of the bicarbonate of potash, and five grains of the citrate of lithia, in the form of powder, being dissolved in one or two ounces of water, should be added to the juice of a fresh lemon in a tumbler, and drank after the first force of the effervescence has subsided. The patient, whether subject to gout, or occasionally suffering from the effects of red sand, whenever tempted beyond the regularity and simplicity of his ordinary diet, either by the refined cuisine of a hospitable friend, or giving way to his own taste for the luxuries of the table, should, on such occasions, neutralise any imprudence he may have committed by taking one of these powders in the way prescribed on going to bed. The tendency to red sand may thus be prevented, and one formidable evil of the gouty habit mitigated, if not overcome.

### SUMMARY OF SYMPTOMS DIAGNOSTIC OF GRAVEL.

Frequency of micturition; more or less aching at the neck of the bladder or extremity of the urethra, relieved by making water; irregular sensations in the course of the cutaneous nerve of the thigh, such as of warmth, or coldness, or numbness, occasional and not constant; lumbar pain, even lumbago, or even sciatica, or wandering, flying rheumatic pains; urine clear when passed, possibly on cooling becoming cloudy from urates, not necessarily; on settling, an abundant sediment of red sand, in amorphous or semi-crystalline red grains of uric acid. The urine set aside in a tall glass has the sides coated with these grains, and a fine cloud of corpuscles is evident, which the microscope shows to consist of mucous or uninuclear cells and epithelial cells from pelvis of the kidney, ureters, bladder, and urethra. The crystalline objects are stellar, rhombic, barrelled, or columnar shaped crystals of uric acid. Digestive organs not necessarily disordered; if so, it is of the gouty type, and there is often evidence of the gouty diathesis.

Uric acid in excess, as well as oxalate of lime crystals in abundance, are not infrequent in some pulmonary disorders, emphysema, and even phthisis, but this condition of the urine must not be confounded with what is commonly known as an attack of gravel.

## CHAPTER III.

### THE ATROPHIED OR GOUTY KIDNEY.

THE influence of gout on the renal structures, or rather of that type of constitution in which uric acid and its compounds are imperfectly eliminated, has, since the study of these diseases became more general, received a certain share of attention. The manner in which this atrophy or shrinking of the kidney is brought about is noticed hereafter. It is this form of renal disorder, albuminuria without dropsy, which is so commonly fatal by uræmic poisoning, giving rise to symptoms which appear to have little reference to the renal functions, and which may be and frequently are accepted rather as evidence of disease of the cerebral organs. In these cases dropsy is altogether absent, or the anasarca is of so trifling an amount as to excite but little attention. Symptoms referable to the brain are those which exclusively attract the notice of the patient, or to which the care of the practitioner is directed. Headache, frontal or sincipital, dimness of vision, simulating the approach of cataract, slight convulsive attacks of an epileptiform character, followed by more aggravated paroxysms of convulsive disorder, constitute one class or series of symptoms : the other is expressed by headache and imperfect vision, followed by dulness of intellect, sluggishness of manner, frequent sopor or drowsiness, or occasional stupor, terminating usually in fatal coma. The absence of dropsy and the insidious approach of these symptoms are well calculated to misdirect the attention of the medical practitioner, and the remedies employed to avert the simulated and suspected apoplectic seizure may be those which hasten forward the fatal effects of uræmic poisoning. The form of renal disease which usually developes these symptoms is the atrophied, shrunken, and nodulated kidney. The early history of these cases is always very difficult to obtain; for in hospital practice the patient is suddenly seized and is unable to give any reliable account of himself or of his antecedents. It is certain that the progress of this form of disease is exceedingly slow and imperceptible, and scarcely appreciable in its early stage, except by the accidental discovery of albuminous urine and the presence of hyaline casts in the sediment. The urine is not deficient in amount, and for the most part of very low specific gravity. The pathology of these shrunken and atrophied kidneys is at present somewhat obscure. I cannot recognise these wasted kidneys as the last stage of morbus Brightii, or as the sequel to any form of kidney disease associated with general dropsy. These atrophied and wasted kidneys, as Dr. Todd has shown, are, for the most part, closely allied to the gouty diathesis. The microscopic appearance of the renal structure suggests the opinion, that the epithelial cells become gradually disintegrated and broken up, without any power of renewal; the convoluted tubes become gradually empty, and subsequently, with the Malpighian bodies, suffer compression and condensation (Pl. VII, figs. 13, 14, 15); while those which remain, scantily or imperfectly supplied with secretory epithelial cells, yield a secretion which is little more than an albuminous fluid of low specific gravity, containing but the faintest trace of urea, or the ordinary essential constituents of the urine. The urea thus retained in the blood and circulating through the system, manifests its poisonous influence specially on the nervous centres, and convulsions, coma, and death, emphatically pronounce the patient poisoned by his own blood.

Case XXXVII.—The following cases are examples of the obscurity which may surround our diagnosis, if attention be not directed to the character of the urine, the symptoms during life pointing to the brain rather than to the kidneys as the organ implicated in disease.

During the last epidemic of cholera a man about fifty years of age was brought to the hospital in a state of half unconsciousness, who was represented as having suffered from diarrhœa for a few days, and had been treated for the prevailing epidemic, his present partially comatose condition being mistaken for the collapsed stage of cholera. But the pulse at the wrist, the temperature of the extremities, as well as of the breath and tongue, forbade such a conclusion. Moreover, the countenance and state of the eyes and pupils were not indicative of the algide state of this epidemic. He passed some water a few hours after admission, and this being found albuminous, was thought a proof that the stage of reaction in cholera had commenced; but a few hyaline tube-casts justified my opinion that it was not the poison of cholera, but of urea, which was hastening on to a fatal termination. The coma increased, and the patient died twenty-four hours after admission. Not a trace of disease was found in the brain; the heart-fibre was very soft, and had a fatty-like feel. It was very granular and fatty. (Pl. VIII, fig. 8.) The kidneys were both very small and shrivelled, and nodulated on the surface. There was an accumulation of fat in the hilum, or cavity of the pelvis. The substance of both organs was hard and dense, and a section displayed the nodular eminences well marked, and of a white granular appearance. Under the microscope the denser portions in immediate contiguity to the nodes on the surface presenting a fibrilloid, or even laminated appearance, and in which the remains of tube-structure might be obscurely traced. In those portions where the convoluted structure was still visible, the epithelial cells seemed only here and there in apposition with the basement membrane, and surrounded or imbedded in a fine granular or molecular substance. (Pl. VIII, fig. 7.)

### KIDNEY-DISEASE SIMULATING BRAIN-DISEASE.

*Coma succeeded by convulsions and death—one kidney atrophied, the other sacculated, and containing, lodged in the dilated calyces, numerous concretions of oxalate of lime.*

Case XXXVIII.—On February 24th, 1851, Edmund B—, æt. 58, was brought to the hospital in a state of unconsciousness and partial coma. He breathed deeply and stertorously, with a blowing, expiratory movement of the lips and cheeks. The eyes were glazed, the pupils contracted, but were, to some extent, obedient to the stimulus of light. The surface of the body was warm and clammy from a cutaneous moisture, which emitted a faint, sickly (urinous) odour. The systolic sound was prolonged, and a murmur was heard both at the base and apex of the heart, and also to the left, under the mamma. The pulse was full and hard, about 100. There was no facial paralysis apparent. There was no rigidity of the extremities of either side; and reflex movements were slightly excited equally on both sides. Deglutition was imperfect, fluid given to drink passed back again by the corners of the mouth. He could not be roused to any degree of consciousness. Those who brought him to the hospital could give but an imperfect account of his past history. He came from an obscure lodging-house, where he appears to have been taken ill some three days prior to admission. He had complained of headache, which was followed by stupor, and this terminating in a more profound state of unconsciousness, a practitioner at once resorted to the expedient under which the ignorant and inexperienced equally take refuge —of opening a vein in the arm. The comatose condition increased, as might reasonably be expected. He was ordered stimulating enemata, and during the night deglutition returned, and he was able to swallow a little fluid nourishment. His pulse became softer and less frequent, and in the morning consciousness was partially restored, and he was able to answer some questions, though incoherently. At 9 a.m. the breathing was reported to be free from stertor; the pupils more natural and obedient to the stimulus of light. He passed some water, which was found to be albuminous, and contained a few hyaline casts and many of the so-called mucus-corpuscles. During the course of the day he became very restless, raising himself in bed, making many efforts to get up, and, as the clinical assistant reported, displaying many of the symptoms of a person suffering from delirium tremens. Profuse perspiration, having a strong urinous odour, broke out in the course of the afternoon. The intellect became more rational; he took fluid nourishment without difficulty; the bowels had acted from the effect of stimulating enemata, and he appeared gradually passing out of the comatose condition, when convulsions suddenly supervened. They were, according to the report of those who were in attendance, of an epileptiform character; they lasted about three hours, when they suddenly ceased, and the patient died at 10 p.m.

*Post-mortem appearances.*—The external aspect of the body was natural. The pulmonary cavity presented no trace of disease. The heart was large, and certainly hypertrophied. There was a considerable atheromatous deposit in the aortic sinus; and the aortic valves were opaque, and somewhat rigid and unyielding. The mitral valve was thickened and stiff at its margin. The bladder contained a small quantity of transparent but albuminous urine. The left kidney was mottled on the surface, slightly lobulated, and covered with nodular eminences; the organ was shrivelled, of less than the usual size, and cut with a dense, hard resistance. Examined under the microscope, the tubes appeared in places compressed into a fibroid appearance. The appearances were very similar to those represented in Pl. VIII, fig. 7, of an atrophied kidney. The right kidney was large and sacculated. The cortical surface in parts was so much dilated, as to display the appearance of cysts. On a section being made, the dilated kidney contained four ounces of a sero-urinary fluid. The infundibulum of the ureter was blocked up by the impaction of a forked or branched concretion of urate of ammonia, mixed with small proportions of oxalate of lime. The calyces were severally dilated into cup-shaped cysts, containing numerous (fourteen) concretions of a dark brown colour, smooth surface, about the size of castor oil seeds, which by analysis were composed of oxalate of lime, with a minute uric acid nucleus.* In the brain nothing was observed worthy of note, there was no indication of disease.

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* The preparation is in the Westminster Hospital Museum.

The arachnoid was slightly opaque; the pia mater was pale; the cineritious substance was pale; there was no excess of fluid in the ventricles.

Neither the hands nor feet exhibited any trace of gouty deposit; but in the cartilage of both ears were one or two minute spots of a white material, which proved, on examination, to be urate of soda. This latter fact would show that the patient was of the gouty habit of body, if the state of the kidney did not otherwise declare such constitutional disposition. It was much to be regretted that no history of the patient could be obtained; nevertheless, in relation to the cerebral symptoms and the absence of all cerebral lesion, and the presence of that form of renal disorganization most calculated to be followed by the sudden arrest of the excretion of urea by the kidneys, this case is one of manifest interest.

The point of greatest practical value is the means of determining the cause of the coma and convulsive paroxysms, the signs by which we may confidently pronounce the coma to be caused by uræmic poisoning, and not by cerebral disorganization. In the absence of any previous history, or any marked antecedent symptoms, the task is the more difficult, but attention to the following points will afford a trustworthy guide.

1. The absence of paralysis, either facial or hemiplegic. The convulsive movements partaking chiefly of the clonic character, consisting of alternate contractions and relaxations, without any permanent rigidity or flaccidity.

The tendency to coma or stupor in the intervals of the paroxysms, and, except towards the latter or fatal period, an evident susceptibility to returning consciousness.

2. The peculiar odour of the cutaneous secretions.

3. The albuminous state of the urine.

All these conditions were fulfilled in this case. There was no facial distortion, or evidence of paralysis anywhere. The features were perfectly symmetrical, which was easily recognised when the blowing, puffing expirations distended the cheeks and lips.

Irritating the soles of the feet produced equal reflex movements on either side, and both arms were equally moved as the patient gradually exhibited indications of returning consciousness. Deglutition was only temporarily suspended. The odour from the surface of the body in these cases is generally very peculiar. I have more than once noticed this urinous smell in similar cases, and when to this is added an albuminous urine, with hyaline casts in the sediment, little doubt need be entertained that the patient is the subject of uræmic poisoning. Such cases certainly hold out very faint prospects of being benefited by remedies. When symptoms of this class declare themselves, the renal disorder has advanced to its final stage consistent with life.

The most appropriate means of relief are sinapisms to the extremities, stimulating hydragogue enemata, and if the patient can swallow, the chlorine mixture, made by dissolving ten grains of chlorate of potass in one drachm of hydrochloric acid and filling a ten-ounce bottle with water, should be at once administered. Nutriment and moderate stimulants being given with discretion.

The connection of these atrophied kidneys with the gouty habit is obscurely shadowed in this case. As no history could be obtained, and as the feet and hands presented no evidence of previous gouty attacks, the inference of this constitutional taint must have been left to the evidence of the numerous concretions of oxalate of lime, had not those white deposits of urate of soda in the cartilages of both ears unequivocally pronounced in favour of the gouty habit. My own observations confirm Dr. Garrod's opinion, that the cartilages of the ear are hardly ever exempt from this deposit in the strongly pronounced gouty habit of body; and where there is any doubt of the diathesis of the individual, an examination of the helix or outer margin of the ear, or of the cavitas innominata, or of the antihelix, will set the question in the majority of cases at rest, by displaying one or more minute white deposits of the urate of soda.

But the numerous concretions of oxalate of lime lodged in the calyces of the right kidney supply evidence of the constitutional predisposition to the uric acid diathesis, and therefore inferentially, of the tendency during life to all the morbid consequences incidental to the gouty habit. As redundancy of uric acid is the source of those morbid processes denominated gouty, so is it also the basis on which oxalate of lime is formed. Oxalate of lime crystals can never be found in fresh or recently passed urine; they are formed by a species of urinary fermentation set up by the mucus present, and are abundant in direct proportion to the amount of uric acid originally secreted.

Lehmann, in the appendix to vol. iii of his 'Physiological Chemistry,' page 453, says, "We must not forget that oxalate of lime may possibly be formed during this process. We know there is a close connection between the excretion of uric acid and the formation of this salt, from the circumstance that in most specimens of urine, both sedimentary and non-sedimentary, oxalate of lime cannot be recognised by the microscope so long as the fluid is fresh, but as soon as crystals of uric acid present themselves, crystals of oxalate of lime may also be discovered; indeed, we generally find that in morbid urine the abundance of these crystals is proportional to the rapidity with which free uric acid separates."

Our present knowledge of the metamorphosis of uric acid under the influence of oxidizing agencies, and its conversion into oxalic acid, urea, and allantoin, or the simple conversion of it into urea and oxalic acid, through the agency of yeast and an alkali at a high temperature, will lead to the inference that the presence of oxalate of lime as a pathological product is to be traced to the transformation of an already formed redundancy of uric acid, rather than to the older conceived notion, that the presence of this acid was to be accounted for by special modes of living or diet. A vegetable diet has been thought capable of generating an excess of oxalic acid in the organism, but it will equally engender an apparent excess of uric acid; that is, in many constitutions a vegetable diet, or excess of vegetables or fruits, will, it is well known, cause the appearance of uric acid crystals in the urine. That the source of oxalic acid in the urine cannot be traced to the presence of preformed oxalates in vegetable articles of food, is, I think, proved by the fact that acid oxalates, or oxalates of lime, are not present in the great majority of vegetables ordinarily used as food.

An acid oxalate of potash is present in the petiole or leaf-stalk of *Rheum palmatum* and *undulatum*, eaten as spring tart. In the family of Chenopodeæ the oxalate of soda abounds, but the only species employed as vegetables are the spinach and the beetroot. The *Salsolas* and the *Salicornias*, once so valuable for the soda which their ash contained, are not eaten except in the rare and exceptional form of pickled samphire. *Crithmum maritimum* and *Salicornia herbacea* are severally used thus, the latter under the common name of glasswort. The former is the true samphire, and I believe does not contain oxalic acid.

The amount of oxalate of lime in the root of Jamaica ginger, and the quantity of that condiment taken with our food, are both too insignificant to be regarded. Even were the amount of oxalates in our vegetable food greater than is here represented, it is not difficult of proof that the preformed soluble oxalates are in their passage through the organism transformed into carbonates of their base, as the tartrates, citrates, malates, and acetates. I cannot regard, therefore, the presence of oxalic acid in the urine, or of oxalate of lime as a concretion, as in any way dependent on the presence of oxalic acid in the vegetables we eat. Totally irrespective of diet, disturbance of the respiratory functions gives rise to augmentation of, or rather to the presence of oxalate of lime in the urine, but not unless a large proportion of uric acid is first formed. It is constantly seen in the urine of patients suffering from emphysema, as well as in phthisis pulmonalis.

I have preparations of this sediment from the urine in these diseases, in which the field is covered with innumerable octohedra of this salt. But in specimens of such urine, if all the uric acid be at once precipitated so soon as passed by acetic or hydrochloric acid, no oxalate of lime makes its appearance. Whatever leads to the augmentation of uric acid in the organism may also lead to the development of oxalates in the urine.

Both a vegetable diet and an animal diet equally tend to the increase of uric acid; disturbance of the respiratory process also increases the proportion of uric acid in the urine; and each of these severally are recognised as conditions favorable to the presence of oxalate of lime. I think, then, it cannot be doubted that oxalate of lime is formed out of the metamorphosis of uric acid. Certainly, so far as the formation of oxalate of lime sediment in urine goes, I think the evidence is conclusive. But whether concretions of oxalate of lime, occurring as renal calculi, are formed by an analogous metamorphosis, is a question still involved in obscurity.

It is certain that the nucleus of all renal calculi is either uric acid or oxalate of lime, and these two pathological products are so intimately connected and appear so mutually dependent, as either to alternate in a succession of layers, which is the case in the so-called hempseed renal calculus, or, as in many uric acid calculi, a nucleus of oxalate of lime becomes surrounded by layer upon layer of uric acid. The calculi which were found in this sacculated kidney are beautiful specimens of this variety of the oxalate-of-lime renal calculus. They are perfectly smooth on the surface, of an oblong ovoid shape, of a mottled yellowish-brown colour, of an appearance not unlike a castor oil seed, and on section displaying a number of concentric layers surrounding a uric acid nucleus.

The sacculated condition of the kidney appeared to have been brought about by the impaction of a concretion lodged in the infundibulum of the pelvis. This was very friable, branched, of dirty dark grey colour, and that portion which was broken off for analysis was composed principally of urate of ammonia and the triple phosphate. Whether any of the renal calculi, formed a nucleus to this deposit has not been ascertained, as it was desirable to preserve the preparation to illustrate the manner in which these sacculated kidneys are formed. The obstruction to the passage of urine along the ureter is only gradually completed; and in most cases the canal is not altogether impervious, as was the case here. The urine is secreted faster than the impeded canal can discharge it. In this way a steady, continuous, but not violent or over-strained pressure is sustained. The dilatation of the kidney thus slowly effected, leads to obliteration of the cortical or secreting part of the organ, and very little of the convoluted structure is ultimately left visible. In this respect the state of both kidneys becomes similar, for the atrophy and shrinking of the left kidney brought about the same deficiency of secreting structure which the dilatation and a sacculated condition produced in the right; so that eventually both organs were inoperative for the complete excretion of the urinary constituents; these, or rather the urea, retained in the blood, which direct experiment has proved to be the poisonous agent, soon displayed its disturbing influence, and headache, defective vision, convulsive movements, coma, and death, comprise a series of symptoms eminently calculated to mislead our judgment as to the cause of the fatal termination.

Case XXXIX.—The following case illustrates the connection of the gouty or atrophied kidney with uræmic poisoning. A short time since, my opinion was requested on the case of a gentleman whose symptoms were thought anomalous. Headache and morning retching were the most prominent symptoms. He had from time to time suffered from bilious derangements, when he would have a semi-jaundiced look. He was of a gouty habit —six attacks in feet and hands in four years. Father and mother were both gouty. A brother recently died of renal dropsy. A sister suffered from gout. Irritability of stomach was now his chief symptom. Micturition had of late become frequent, particularly at night; urine was passed freely and copiously; no sediment. He did not suffer from either dyspnœa or palpitation. The sounds of the heart were feeble but rhythmical. The urine had a specific gravity of 1015; only a faint sediment formed. It was moderately albuminous—about one third.

The microscopic appearances were—many mononuclear cells, larger and more opaque than the ordinary so-called mucus-corpuscle. A number of large compound granule-cells, fatty and granular. A few oval cells, apparently epithelium from the ureters, and some lozenge-shaped crystals of uric acid. One faint hyaline cast was seen. I looked on them as unfavorable indications, and I expressed my fears that it was a case of atrophic or gouty kidney.

A few days after I saw him a smart attack of gout appeared in one foot, with immediate relief to the irritable state of the stomach and to the headache. His appetite returned, and this favorable state continued a few days, but the gout left the foot somewhat abruptly, when vomiting, headache, and inappetency returned. I saw him again a few days after, when his condition was evidently becoming worse. Dimness of vision, (amblyopia,) had supervened. He could scarcely distinguish the largest type. The urine became very abundant, with thirst. The headache was followed in a day or two with slight convulsions, at first of an epileptiform character, and eventually passed into coma, in which state he died. This was clearly a case of atrophied or gouty kidney, fatal by uræmia.

### *Chronic gout—albuminuria—hyaline casts—abortive epithelium —large compound granule-cells.*

CASE XL.—The case of Alfred G—, æt. 34, a painter, is a good example of chronic gout, hereditary and acquired, with albuminuria, and probably atrophied kidneys. It is not often that we witness such ravages of the disease at this comparatively early period of life, except where the habits of the individual have been engrafted on a strong constitutional predisposition to the uric acid diathesis. I select this case, moreover, as an example of the ravages which gout inflicts on the renal organs, and as an illustration that in chronic gout we may expect to find albuminous urine with tube-casts; and that gout ultimately leads to disorganized kidneys, but of a character very different to what we meet with in morbus Brightii. In that class of renal disorders the kidneys most usually exceed in weight the healthy organ, while in gout the kidney more frequently becomes atrophied, shrunken, nodulated, and deficient in size and weight. Dr. Todd very appropriately named this *the gouty kidney*. The atrophied kidneys associated as they are with albuminous urine and tube-casts, have been considered, more particularly by some Continental pathologists, as the third stage of Bright's disease—

The first being that of hyperæmia,
The second that of exudation and increased weight,
The third that of atrophy and complete degeneration.

But I cannot accede to this view. I have never been able to satisfy myself that the atrophied and contracted kidney had ever been the seat of exudation, or had passed through the stage of inflammatory engorgement, and its tubes blocked and choked with a granular and fatty molecular deposit, as is the case in true morbus Brightii.

These cases of atrophied kidney rarely exhibit any amount of dropsy. Trifling anasarca of the ankles may occur, the effect of asthenia and debility, but it is neither a constant nor a necessary symptom. The history of such cases furnishes no record of any antecedent dropsy. The urine is usually pale, of a low specific gravity at the latter periods of the disorder, and contains more or less albumen. At an earlier period uric acid and the urates abound, and may be observed as crystalline products in the sediment. Oxalate of lime is also frequently present. In fatal cases the cause of death may most frequently be traced to symptoms of uræmic poisoning, referable to the influence of the retained urea on the nervous centres.

The atrophied kidney, then, though it gives rise to albuminous urine, rarely produces renal dropsy, nor any of the symptoms characteristic of Bright's disease of the kidney. It must be considered a disease of the kidney *sui generis*. It may occur in individuals who have not, during life, exhibited any gouty symptoms, but as it is most frequently associated with the gouty habit of body, it may, in accordance with Dr. Todd's views, be significantly designated as the *gouty kidney*.

This patient, G—, had been many times in the hospital with attacks of gout, but it was only recently that albumen had been observed in his urine. He had the first attack at the early age of seventeen; if his description can be relied on, this was very slight, and confined to the knuckles of one hand. An interval of some years occurred before he had another. Recently they had become more frequent and more severe. His father suffered from the same disease. He had of late been out of work, and his means scanty. Had drunk freely of beer and gin. Five days previous to admission he suffered from wandering pains in the limbs, settling in the elbows, and extending to the fingers of both hands, which became the seat of gouty inflammation. The ankles of both feet and the toes became similarly affected. The first and second phalangeal joints of the right hand were the seat of a deposit of urate of soda. All the joints of both hands are enlarged and thickened from previous inflammatory attacks. The tongue was coated with a white creamy fur; the pulse was full and rapid; the urine was clear, but threw down uric acid crystals on cooling, and was albuminous. The bowels were sluggish. He was ordered three grains of calomel and a grain of the acetic extract of colchicum at bedtime, and effervescing draughts of the citrate of potash.

The hands were placed in the spongio-piline gloves. Four days after, the inflammatory state of the hands and feet abated. There was less swelling and more mobility about the joints. The bowels acted very copiously. This active state of the bowels continued for several days, and was to be traced to the influence of the colchicum, for it ceased so soon as the colchicum was discontinued.

On the 31st of December, eleven days after admission, he was pronounced convalescent from this attack; but the joints of the fingers of both hands, by their thickened state, afforded proof of the frequency with which gouty inflammation must have assailed them, which was further confirmed by several spots of chalky whiteness beneath the cuticle, resulting from deposits of urate of soda, which show a greater disposition to form in and around the lesser joints of the fingers than in any other part.

The patient went out daily for air and exercise. Whether, on these occasions, he was tempted to break through the abstinence from beer and fermented drinks, which had been enjoined, or from exposure to cold, or from the gouty material not having been thoroughly expelled, on the 14th of January he suffered a relapse, and the gouty inflammation returned to the hands with more intensity than before. The urine was clear, moderate in quantity, and slightly albuminous. I determined this time to treat him without colchicum: he was ordered only the bicarbonate of potash and citric acid. In eight days this attack subsided, and by the 31st of January he was pronounced convalescent, and on the 4th of February was discharged. In the following year, on the 27th of January, 1857, he was again admitted, suffering from gouty inflammation of both hands, and the following record was kept by Mr. Perreau, the clinical assistant: There was swelling and redness of the forefinger of the left and little finger of the right hand, accompanied by a deposit of gout stone, which was white and visible to the eye. There were wandering pains in the larger joints, settling more intensely in the right knee and foot, becoming more aggravated at night and towards morning. The tongue was clean, pulse slow and irregular; slept badly; urine high coloured, cloudy, and deposited pink urates on cooling; redissolved by heat, which, being increased, caused the urine to become hazy by the deposit of albumen. During the last two months he had not been free from gout; inflammation lurking about the smaller joints, as fast as it subsided in one finger reappearing in another. From the aggravation of his sufferings at night-time, and having had no rest for some time, he was ordered half-grain doses of morphia, with two of the acetic extract of colchicum, at bed-time, and the carbonate and acetate of potass in effervescence with citric acid, three or four times daily.

Punctures were made with the point of a lancet through the cuticle immediately over the deposits of the urate of soda, which were let out with great relief to the patient, as the gouty inflammation did not re-appear at these joints.

On the 5th of February the ring finger of the left hand became much swollen, and a gouty deposit could be seen through the inflamed cuticle; this was also let out, with relief to the local symptoms. He suffered at this time from erratic pains, flying from joint to joint, principally affecting the shoulders, elbows, and knees. He complained also of a peculiar distressing sensation across the superior portion of the sacrum, which he described as similar to a pail of cold water being dashed on it.

On the 9th of February the gouty inflammation of the hands had disappeared, but he continued to pass very bad nights, from the wandering pains in the larger joints. The colchicum had been discontinued after the fourth night; but he continued the morphia.

The urine had become quite clear, very pale, of specific gravity about 1015, and albuminous. The sediment of a sample, left at rest for a few hours, was examined under the microscope, and the objects seen were a few granular corpuscles and pus-cells, many large compound granule-cells—probably epithelium, in a high state of degeneration—several amorphous crystals of uric acid (grit), and a few flakes of granular appearance highly stained with hæmatin; no casts were observed. (Pl. VIII, fig. 9.) The saline medicine was continued. He had occasional purgatives of blue pill and colocynth, followed by a warm purgative draught in the morning. The urine became more abundant, of a sp. gr. 1010, and decidedly less albuminous.

By the end of February he had greatly improved in health. On the 9th of March the urine still slightly albuminous, hazy by heat, of a sp. gr. of 1010, was again examined under the microscope. Some fine transparent casts were seen, containing granular cells, in which no nucleus could be detected; large compound granule-cells, with very resplendent fat-granules within, and numerous scattered granule-cells looking like abortive epithelial cells. (Pl. VIII, figs. 10, 11.) There were also a great many granular flakes, stained of an orange-red colour, which I have reason to think was derived from the urine rather than from the blood.

On the 19th of March he was discharged in a very improved state of health. The spots from which the gouty concretions had been let out healed with some difficulty, and one continued to discharge a white creamy fluid of urate of soda till within a day or two of his discharge.

There are several points worthy of observation in this case.

Firstly. The early age at which the gouty deposit of urate of soda was formed, implying an hereditary predisposition.

Secondly. The little influence which colchicum appeared to exercise over the gouty inflammation.

Thirdly. The probable extent and nature of the renal disorganization which might be going on.

The ravages which the gouty inflammation had produced in the lesser joints of the hands, and the abundance of the urate which had been deposited, plainly testified to the inveteracy of the gouty material formed within the organism, and this should be regarded quite as much, if not more, the result of constitutional predisposition inherited, than caused by habits, however irregular or provocative of gout.

It can hardly be conceived that any amount of gout-forming food or drink, or habits however calculated to promote gout, should, without a marked constitutional predisposition, have engendered so much gouty material as, at the age of thirty-four, to have crippled the hands and lodged "chalk-stones" in almost every joint. This man's father was gouty—died of gout. The frequency of the transmission of this disease to offspring is nearly four times as great from the father as compared with the mother. That is, in forty-four cases of gout, where the parents were gouty, thirty-two were hereditary from the father, nine from the mother, and only three from both father and mother. These data are on the authority of Sir C. Scudamore. This is to be explained by the fact that gout is far more frequent among males than among females.

If we can believe this patient, he had gouty inflammation of the hand at seventeen. If this be true, nothing could exhibit more forcibly the hereditary taint and disposition: for it is not conceivable that at that age habits had been acquired which were in themselves sufficient to generate gout. His subsequent course of life, however, had without doubt irremediably stamped on the constitution such susceptibility to the formation of gouty material, that the most trifling disturbance to the equilibrium of health sufficed for the production of fresh matter, and a renewal of the gouty attack.

Colchicum appeared to have had little influence over the gouty paroxysm. This remedy, once so popular, and regarded by some almost as a specific for gout, has fallen much in general estimation as a remedy in this disease. Experience tells us, that if it shortens a present paroxysm, it shortens also the intervals between the attacks. But I think this is only true when the patient has habituated himself to the use of colchicum, or when the remedy has been employed in sufficiently large doses to produce a sensible effect both on the nervous and circulating, as well as the excretory, systems.

There is a fashion in remedies as well as in dress. That which has been once popular and notorious is very likely to be in its turn disregarded, and even neglected; and this is certain when a false value or a mistaken reputation attaches to medicinal remedies. One of the clearest duties of the physician, particularly he who is engaged in clinical teaching, is to determine on what principle a remedy acts; to be not content only with the *apparent* results of a given remedy, but able to explain, or even to demonstrate, the manner of operation, and consequently to show the reason why it is entitled to our confidence, and why its action may be expected to be beneficial in any particular disease.

Colchicum in medicinal doses will act either as a purgative or diuretic. In doses sufficiently large to produce the former effect it operates powerfully on the nervous system as a sedative, and consequently displays a corresponding influence over the force and frequency of the heart's action. It is thus supposed beneficially to control inflammatory action by lessening the force of the circulation. In such doses it also acts violently on the mucous membrane of the intestines, and produces the well-known colchicum stools. The tincture, or the wine, or the acetic extract from the cormus, have been severally employed for these purposes. It may be regarded as doubtful whether such effects are productive of benefit; and experience, both of patient and physician, proclaims that colchicum thus given produces no lasting benefit; on the contrary, leaves the patient more susceptible to the gouty influences, and contracts the intervals of the attacks. But colchicum in small doses acts as a diuretic. The kidneys are the channels through which the morbid element of gout, the uric acid, is eliminated from the system. They are the special emunctories of this constituent of the urine, which, if not excreted in proportion to the rapidity of its formation, is retained in the blood, and becomes the proximate cause of the gouty inflammation. Is there anything peculiar in the action of colchicum as a diuretic which renders it, in small doses, specially remediable in this form of disease?

This question may, I think, be answered in the affirmative; for it can be shown that colchicum increases the amount of urea and uric acid excreted. ('Therapeutic Action of Colchicum,' by Dr. J. Maclagan, 'Monthly Journal of Medical Science,' January, 1852.) Now whatever, directly or indirectly, aids in the elimination from the organism of the uric acid and its allied constituent urea, must inferentially remove the morbid material of gout. Experience confirms these views, for while colchicum in large doses, acting as a sedative and purgative, but temporarily and imperfectly controls the gouty paroxysm, in small and frequently repeated quantities it promotes the excretion through the natural outlet of that material which is the immediate source of the disease. To obtain these effects from colchicum, from five to ten minims of the wine of the cormus should be given about three times a day in conjunction with any diuretic salt; the bicarbonate of potass in effervescence with lemon-juice is a convenient vehicle. The dose of the wine should never exceed ten drops.

In the case under consideration the character of the urinary sediments, together with the presence of albumen, though in small quantity, testified plainly enough that the kidneys were undergoing a slow but certain process of disorganization. This, in the gouty kidney, usually consists in a shrinking or atrophy of the organ; the surface of the kidney becomes nodulated; the cortical structure seems entirely wasted, so that it forms a mere line of investment, the base of the cones approaching closely to the margin, and the straight tubular structure of these parts becoming frayed or spread out. The tubular structure of the cones remains unchanged to the last; so that it is in the cortical portion alone that the process of atrophy or wasting has proceeded. This seems to consist in the gradual destruction and breaking-up of the glandular epithelium of the convoluted tubes, without any effort of reproduction. In the different conditions of the kidney in morbus Brightii, the tubes are filled either with a fine molecular granular matter, with more or less fat intermixed, or in the true fatty kidney, with the latter product predominating; these are, with every probability, derived from the disintegration or breaking-up of healthy or abortive cells; but the material is retained, and in the fatty kidney the fat-nuclei, aggregating together, form accumulations giving a waxy or spermaceti-like aspect to the section of the organ. But in the contracted and atrophied kidney the very reverse of this obtains. The cortical portion of the kidney, or what remains of it, appears to consist of a condensed fibrous structure, as of tubes compressed into filaments. Where the tube-structure is yet apparent, it appears deprived of its epithelial lining. The epithelial cells in those convoluted tubes which are yet visible appear detached and mixed with a fine granular matter, ready to be washed away by the stream.

The glandular epithelial cells thus isolated readily break up in the watery albuminous fluid poured out from the Malpighian tufts, and the débris is washed away in the current. There is no reproduction of cell-structure, and the empty tubes become compressed and consolidated, and diminished bulk and shrinking of the organ is the natural consequence.

These conditions are verified by the microscopic appearances of the tube-structure of an atrophied kidney. (Pl. VIII, fig. 7.) During the last cholera epidemic, a man about fifty years of age was admitted, suffering from what was thought to be choleraic diarrhœa, which had been on him for ten days; it ceased the day after admission, and he became comatose for thirty-six hours, with some stertor, but no convulsions. The urine passed six hours before death was albuminous. There was nothing in the brain to account for the coma. Both kidneys were shrunken and atrophied, nodulated on the surface, and containing an abundance of fat in the cavity of the pelvis. The left kidney was the smallest, and weighed less than three ounces. (Preparation, Hospital Museum, Ser. VII, 1, 2.) The right was not so far advanced. The cortical portion of the kidney was seen only in the nodular eminences, which had a white-fawn colour. The base of the cones seemed to merge, by the frayed-out tubes, into this thin cortex. The microscopic character of one of the nodular eminences is represented in Pl. VIII, fig. 7. The tubes appear everywhere deprived of epithelium, and the cells detached and buried in granular material. These appearances are gradually merged into a dense fibrous-looking structure, in which all tubular form is lost.

The frequent occurrence of atrophy of the renal structure in the gouty habit of body leads to the inference that the gouty material, in its passage through the kidney, ultimately exercises a destructive influence on cell-structure. How this is brought about we are at present ignorant. Whether in this kind of disorganization we have an example of atrophy following long-continued over activity of function, cannot yet be determined. It would almost seem, from the appearance of the renal structures, that the constant strain occasioned by the presence of the morbid material of gout led to the gradual destruction of the gland-cells, without any tendency or effort to reproduction. The débris of the cells is carried away by the urinary current, and the empty tubes, pressed on by surrounding parts, collapse, shrink, and eventually appear condensed into a fibrinous-looking structure, giving to the kidney a contracted nodular surface.

## SUMMARY OF SYMPTOMS DIAGNOSTIC OF THE GOUTY OR ATROPHIED KIDNEY.

The gouty habit more or less apparent—often obscurely so; occasional frequency of micturition; urine usually abundant, pale, clear, and often lemon-coloured, with a faint cloudy sediment, or entirely free. Specific gravity usually low; albuminous sometimes abundantly—half. The microscope reveals in the sediment collected in the usual conical urine glass, hyaline or slightly granular casts, or purely hyaline or glassy (Pl. IV, fig. 12); débris of cells apparent; highly resplendent nuclei, like fat-granules, often aggregated into mulberry or grape-like clusters; frequent headache, frontal, sincipital, and occipital; imperfect vision—dimness; digestive organs much disturbed, vomiting and retching and great irritability of the stomach; dropsical symptoms, except œdema of the ankles, often absent; convulsions or coma may supervene, or symptoms of apoplexy may close the scene.

# CHAPTER IV.

## CALCULOUS DISEASE OF THE KIDNEYS, PURULENT URINE, AND RENAL ABSCESS.

### *Calculous Pyelitis.*

The value of the information yielded by the microscopic appearances of the urine depends altogether on the care and accuracy with which these are applied to the symptoms and condition of the patient. When the special character of these deposits is correctly interpreted, the information becomes an essential aid to diagnosis, and consequently affords the surest basis for treatment. The cause and nature of a dropsical state of the system are at once recognised, when in albuminous urine there are found fibrinous, granular, or hyaline casts, with either blood-corpuscles, epithelial cells, free nuclei, granule-cells, or fatty matter associated with them. The pathology of dropsy with such concomitants differs from that form of dropsy in which the urine is non-albuminous and free from all deposit. Cardiac and hepatic dropsy are instances of local and general dropsy without the kidneys being necessarily implicated. On the other hand, cases occur in which the urine is albuminous, throws down an abundant sediment, and yet there is no dropsy. But the sediment here consists of pus-corpuscles, scattered blood-corpuscles, amorphous fibrinous coagula more or less stained, but no casts of the tubes. If in such cases there be great irritability of the urinary organs, frequent micturition, with pain referred to the neck of the bladder, perinæum, or penis, a suspicion is at once excited of disease of the kidneys, but very different in character from that which is predicted where the albuminous urine is associated with dropsy, and where the sediment consists of tube-casts and disintegrated or abortive cells.

The presence of pus-corpuscles in the urine is, however, not sufficient evidence of renal disease. In gonorrhœa, or catarrh of the bladder, or gouty inflammation, pus-cells would find their way into the urine. In stricture, or chronic gleet, membranous or fibrinous débris, often entangling minute clots of blood, are seen in the urine; and yet no suspicion of renal disease from such appearances would be justifiable. It is only by a careful comparison of the sedimentary matters in the urine with the general symptoms of the patient that we arrive at a correct diagnosis.

Inflammation of the pelvis of the kidney, excited by the irritation of a calculus, is a source of purulent urine, and the preceding remarks will be illustrated by reference to the following cases of chronic pyelitis.

The symptoms most characteristic of pyelitis are, rigors, with lumbar pains, sometimes dull and continuous, sometimes pungent and darting; often extended to, and becoming fixed at the crest of the ilium, or prolonged to the outside of the thigh, with numbness or some altered sensation in the course of the external crural cutaneous nerve. There may be retraction of the testicle of the same side in the male; there are frequent micturition, and great irritation of the urinary organs. The patient complains of pain in the perinæum, or in the neck of the bladder, or feels a darting pungent sensation along the urethra, fixing itself in the glans penis, till temporarily relieved by passing urine. The quantity passed each time is exceedingly small, a few drops, or at most half an ounce, and the urgency of passing these small quantities recurs at very short intervals of time. The pain in the bladder, perinæum, or penis, is always temporarily relieved by micturition, and there is no difficulty nor obstacle to the free flow of urine. In stone in the bladder, or stricture, these symptoms would materially differ. The urine in chronic calculus nephritis, when first passed, is cloudy, or perhaps milky, but when set at rest quickly separates into two portions, an upper, clear, natural-looking urine, containing albumen, and a lower, distinct sediment, more or less of yellow colour, consisting of pus-corpuscles, amorphous membranous shreds or flocculi, with scattered minute blood-coagula, according to the stage of the disorder.

Amorphous or crystalline uric acid, or other earthy grit, may be present. Hæmaturia often—always, I believe—occurs at the outset, and it often returns during the progress of the disease, in sufficient quantities to cause discoloration of the urine.

If the disease have existed a certain time, there may be fulness of the lumbar region from enlargement of the kidney of the affected side; for it may happen that a concretion of urate of ammonia or triple phosphate becomes permanently fixed in the pelvis of the kidney, a partial obstruction to the flow of urine from the pelvis into the ureter follows, and an encysted or sacculated kidney is formed by the dilating influence of the retained and accumulating urine. If, on the other hand, the calculus descends into the bladder, a train of symptoms of what may be called nephritic colic supervenes, which clearly indicates the descent of the concretion into the bladder.

The following case was admitted into Burdett ward in the summer of 1855.

Case XLI.—William M—, æt. 34, a groom, a native of Suffolk, first began to complain in the spring of that year of a sharp pungent pain in the right lumbar region, which extended downwards in the direction of the bladder. At this time he was troubled with constant desire to pass water, and he noticed sandy grit in the chamber vessel. The pain and distress were always greatest before passing urine, and were relieved by that act. His chief symptoms related to the pain in the perinæum and bladder, the frequent micturition, and the want of continuous sleep. The urine when passed was milky in appearance, and soon threw down, when at rest, a copious precipitate of pus-corpuscles. (Pl. X, fig. 1.) Membranous shreds entangling a minute speck of blood were seen among the purulent deposit. The patient had frequently noticed similar appearances. The sediment, in addition to the pus-corpuscles, exhibited a few blood-discs, with numerous amorphous shreds of fibrine stained with hæmatin. He suffered much lumbar pain, and great increase of distress before micturition. Cupping relieved these symptoms, and he was ordered linseed-tea and tincture of henbane, which also seemed to mitigate the symptoms; he also experienced relief, he thought, from the warm bath, which he used each night before bedtime. The diagnosis of the case rested on a comparison of the chemical and microscopic characters of the urine with the symptoms and sufferings of the patient; and there was sufficient evidence to establish the opinion that it was a case of chronic pyelitis, originating in a calculus impacted in the kidney. The troubled, turbid, milky urine, containing albumen and pus, clearly indicated some morbid irritation in the urinary apparatus, and the pain and uneasiness in the perinæum and bladder, and the frequency of micturition, justified the limitation of our inquiry to this region.

But we had to interpret from these symptoms the part of the urinary apparatus which was the seat of the disease, for these conditions, in some respects, are common to many different disorders; yet if they be carefully analysed, and a just comparison established between the one and the other, we shall ultimately arrive at a correct diagnosis of the disease. Turbid troubled urine, with painful and frequent micturition, may occur in stricture, gleet, or gonorrhœa; but in the two latter, the character of the pain during the passage of the urine, and the appearance of discharge at the orifice of the urethra, not to say the stains on the linen of the patient, would make the case sufficiently clear. In stricture, in addition to turbid urine, when gleet is present, there may be membranous shreds, and even minute coagula, such as have been noticed in the urine of the patient under consideration. But, in such a case, the pain and distress are felt during micturition, not before; the urine passes with difficulty, or in drops, or in a diminished stream, and an exploration of the urethra proves the impediment to the free passage of the urine. In calculus of the bladder similar conditions of the urine might exist, and much pain be experienced in the bladder, perinæum, and penis: but the pain in such cases is most aggravated after micturition; as the bladder fills the pain diminishes; just the reverse happens in the painful and irritable bladder of renal disease. Moreover, an exploration of the bladder establishes the presence of a stone. In the case before us, the patient referred the commencement of the pain to the region of the kidney, and described the pain as if descending thence in the direction of the bladder, and becoming pungent and stabbing in the perinæum, and occasionally extending itself to the extremity of the glans penis. These distressing sensations were always relieved by micturition, and there was a temporary lull till the urine collected again, even in small quantity. This fact is of much importance in the diagnosis of renal disease, and, taken in conjunction with the history of the case, with the albumen, and amount of the purulent sediment in the urine, and the peculiar character of the lumbar and regional pain, constitutes very fair evidence of inflammatory action in the pelvis of the kidney.

In cases of inflammation of the bladder, cystitis, or catarrh of the bladder, and limited to that cavity, the character and quality of the urine differ much from what is excreted in renal disease. The urine is contaminated by the inflammatory exudation from the vesical mucous membrane; pus-cells, and the so-called exudation-corpuscles, are present in abundance; but the pus-corpuscles do not subside as a distinct and well-defined precipitate; they are entangled in a ropy magma, in which numerous crystals of the triple phosphate are visible; this viscidity and these crystals being rapidly developed by the agency of the alkaline urine always voided in inflammation of the bladder. This character of the urine will suffice to distinguish vesical from renal inflammation.

The ready separation of a turbid or milky urine into two parts, a clear supernatant portion containing albumen, derived from the liquor puris, and a sedimentary portion of pus-corpuscles, distinctly precipitated, voided by a patient who suffers from severe pain, either in the kidney, aggravated by pressure or motion, or in the bladder, perinæum, or penis, relieved temporarily by micturition; and in whose urine gravel or blood, or both, has been, at some antecedent period, present; constitute a collection of symptoms in which little hesitation can be felt in referring them to chronic inflammation of the pelvis of the kidney.

After the patient had been in the hospital a fortnight, the quietude, the diet, the effect of warm baths, opium, and local depletion, seemed to have produced a certain beneficial effect. Micturition was less frequent, the pain was less urgent, and the bladder consequently retained the urine in a larger quantity. This interval also enabled us to observe the further indications of this disease. The pain in the region of the right kidney, or rather in the right lumbar region, was modified or aggravated according to certain positions. Thus he was easy, comparatively, while he was laid flat on his back, but the pain commenced when he turned on either side, and continued so long as he remained in that position. In lumbago there is severe pain in the loins; this pain is aggravated by motion, rising in bed, or turning from one side to the other; but it subsides as soon as the body is at rest, in whatever position that may be. It is stated in the ward-book, that in the third week of his treatment the urine on one occasion was observed to be quite clear, free from albumen, free from any notable deposit or sediment, and presenting only a few scattered pus-corpuscles when examined by the microscope; but that the next day, after an aggravation of symptoms, the urine became turbulent and purulent to a degree equal to what it had previously been. This state of things justified still further the diagnosis, and afforded proof that only one kidney was affected. It happens in these cases, not unfrequently, that a temporary suppression, or rather retention, of the purulent secretion from the pelvis of the kidney is caused by the obstacle impacted in the outlet, either receiving some fresh addition to its bulk, or by some temporary pressure made on the contents of the kidney effecting the closure of the small aperture in the head of the ureter, through which the purulent fluid from the kidney passes into the bladder. It follows that the other kidney being free from disease, the urine secreted will present no morbid conditions This is the right interpretation of such specious symptoms, which rarely endure for more than a few hours; and the advice of Rayer, writing on this form of disease, is fully confirmed, that we should never be satisfied with an examination of urine passed at one single interval of the day, but in all such cases specimens should be seen of each act of micturition. Further depletion was not thought desirable, and the patient, in the fourth week, was placed on the sesquichloride of iron. His symptoms remained much the same—occasionally severe paroxysms of perinæal pain, with much irritability of the bladder, and abundant purulent deposit in the urine, and then a few days of comparative freedom from renal distress. At this period he complained on one occasion, early in the morning, of an attack of more than usual severity, commencing with a violent throbbing in the right lumbar region, with a piercing, darting pain in the perinæum; and after some little trouble in passing the last part of a small quantity of urine, he found a membranous film protruding from the orifice of the urethra, which he only partially succeeded in drawing out. He described it as like jelly. In the course of the day, a further portion was passed. During the remainder of his stay in the hospital, this symptom did not recur. This gelatinous kind of exudation has been noticed in analogous cases.

In the treatment of these cases our chief reliance must be placed on the palliative agency of opium. If it be a case of calculous pyelitis—that is, chronic inflammation of the pelvis of the kidney arising from the irritation of a calculus impacted therein—it is quite obvious that so long as the irritating agent remains, so long will the symptoms of chronic inflammation continue. We have no remedies that can either rapidly dissolve or remove such a concretion, and the progress of the case must ultimately depend on the form and composition of the calculi, some of which escape into the bladder, with symptoms characteristic of their descent through the ureter, and which, if their diameter be but small, may be discharged through the urethra; this is more likely to happen in the female. A small concretion now before me excited renal inflammation, and gave rise to purulent urine; violent colic pains suddenly arose; there was most urgent retching and vomiting, and the concretion reached the bladder. A few days after the subsidence of these symptoms, the patient's urine suddenly stopped, and after a few distressing and painful efforts of straining was ejected with violence, and a hard substance fell into the vessel. Fortunately the patient was in his bed-room, and the calculus was preserved. It does not exceed a pea in size, is very jagged on the surface, and glistens from the deposit of crystals of triple phosphate on its circumference, but its composition internally is oxalate of lime. This happened seven years ago, and the patient has never had any renal symptoms since. These numerous concretions and earthy débris are also from the kidney; they were passed eight years since with symptoms of pyelitis. These are the most favorable terminations to renal calculus. In other cases, the calculus, having escaped from the kidney, lodges in the bladder, and gives rise to the usual symptoms, relief from which can only be obtained by the assistance of a skilful surgeon. But in by far the more numerous cases of calculous pyelitis, the concretion grows by the apposition of fresh matter, becomes impacted in the head of the ureter, does not completely occlude the outlet, but becomes branched and irregular in shape by the constant deposit of phosphatic matter derived from the action of a purulent fluid on the urine, still secreted by the intact part of the kidney; the fluid retained in the pelvis of the kidney constantly exerts a dilating influence, and in the progress of the case a distinctly fluctuating renal tumour is felt; and if the history and symptoms of such a case be carefully collated, the diagnosis is not difficult. (Hospital Museum Preparation, Series vii, 1, 2.) This preparation of a branched and ragged calculus impacted in the pelvis of the kidney, with a sacculated condition of the organ, illustrates these remarks. It must be clear that medicinal remedies can exert but small curative influence in such a case. To palliate and relieve is for the most part at present the limit of our aid.

In the case which has formed the subject of these remarks, we may consider that perfect quietude, the warm-bath, cupping on the loins in the early period, and opiates, were the agents through which partial relief was obtained. The infusion of buchu, the sesquichloride of iron, and the nitro-muriatic acid, although severally administered, cannot be said to have done anything for the relief of the patient. He was made an out-patient six weeks after admission, and on October 2nd, ten weeks from the period of his discharge, his urine remained the same, and his symptoms were unchanged, so far as the report of his wife could enable me to judge.

In the management of such cases, while we acknowledge how little beyond palliation medicinal remedies can effect, it must not be forgotten that a well-regulated diet, and a regimen regulated by the probable chemical character of the concretion, may, and often does enable the patient to reach a fair average period of life. If the patient exhibit any marked characters of the uric acid diathesis, alkalies, particularly the bicarbonate of potash in lemon-juice—or, where the means of the patient permit, a visit to some alkaline mineral spring, such as Vichy—is attended with benefit.

I have reason to think, that what was formerly considered as the oxalic acid diathesis, is but a modification of that constitutional disorder which exhibits itself in the excretion of uric acid, and its compounds in abundance. I have in another part of this work expressed my reasons for this opinion.

This patient has been under my observation from the period of leaving the hospital, in the summer of 1855, to the date of these sheets going through the press. His sufferings are great, yet he keeps up a fair appearance of health. He is able to move about freely, but is not sufficiently strong to do laborious work.

In October, 1855, the urine remained without any alteration of character; it was simply purulent urine. He spoke of some peculiar sensations of coldness in the scrotum, and extending down the inside of the thighs, such as no external warmth would relieve. Such alterations in the local condition of common sensation are very various in these cases.

He continued to derive relief from half-drachm doses of the Liquor Opii Sedativus. I did not see the patient again till August, 1856. The pain had become less urgent—not so continuous, occurring in paroxysms. He took cod-liver oil, with opiates, when necessary, and in October, 1856, I was gratified to find a very manifest improvement in him: he had gained both strength and flesh. The frequency of micturition, with the attendant pain, had diminished so much, that he was not called upon to rise more than twice in the night. The urine was still milky, and contained pus-cells. In April, 1857, he suffered a fresh attack of hæmaturia. The urine was cloudy and dark coloured, and being left at rest, separated into a clear reddish upper part, and a deposit, the surface of which was of red corpuscles, the lower of pus-cells. It seemed by this arrangement that the greater density of the pus-cell had caused their subsidence first—thus allowing the smaller and lighter blood-corpuscle to rest upon them as an upper layer. The microscopic appearance of this urine is represented at Pl. X, fig. 3. several membranous shreds of an orange colour were present, oxalate of lime crystals, pus-cells, granular-cells, blood-corpuscles, scattered over the field, some free nuclei highly resplendent, some uric acid grit, and a few large compound granule-cells.

After this attack his former symptoms returned with unabated intensity. Micturition was as frequent as from ten to twelve times in the night; every half hour; getting no sleep, and opium apparently losing its influence. However, it soon became apparent that larger doses of the anodyne succeeded in obtaining relief. In February, 1858, he stated to me that his symptoms had remained without much alteration for many weeks past. He suffered very much the same kind of pain as when in the hospital. The urine had the same purulent character, but was free from oxalate of lime; no blood-corpuscles were seen; large compound granule-cells and pus-corpuscles, with free nuclei, were the microscopic objects, Pl. X, fig. 4. The increased proportion of granule-cells may be considered a favorable indication.

So long as the disease is confined to one kidney, the patier
may live for years, suffering from occasional aggravation
pain, till the calculus either becomes completely encysted,
by blocking up the canal of the ureter at its commencement i
the infundibulum of the pelvis, the kidney slowly but at lengt
becomes sacculated and pouched. The Museum contains son
very characteristic specimens of this process. Preparation
Series vii, 1—4.

April 3, 1858. This patient had suffered for the last tw
days an attack of hæmaturia, without any great aggravation
his symptoms. The sample of urine brought was blood-coloure
and he stated that yesterday (Good Friday) he passed one
those blood-clots formerly mentioned, which remained plugge
for a time at the orifice of the urethra—causing some painfu
straining before it was ejected. The character of the sedimen
at this period was that of recent hæmaturia. (Pl. X, fig. 5.)

### PURULENT URINE.

*Calculous Pyelitis: hæmaturia, followed by nephritic colic, vomiting, and purulent urine.*

Case XLII.—M. J—, æt. 32, the mother of one child,
a delicate frame of body, and in whom lactation had ceased tw
months; the catamenia had twice appeared; suffered from grea
uneasiness and pain across the loins, with a dull, aching sens
tion, which was referred to the crest of the ilium of the left sid
Two days from the commencement of these sensations, an
whilst suffering some febrile disturbance, she passed some con
siderable quantity of blood with her water. There had been n
vaginal discharge, nor was there any appearance of blood, ex
cept when she passed urine. The hæmaturia continued for fou
or five days, when the urine gradually lost the appearance
blood; and before it finally disappeared, a sandy, gritty depos
was noticed in the chamber vessel. About the seventh da
from the commencement of the hæmaturia, violent griping pai

came on, passing across the abdomen, and descending towards the pelvis, which was accompanied by distressing retching, and vomiting. She had been judiciously treated by Mr. Hunt, of Tachbrook-street, who, however, felt some doubt about the nature of the case. The countenance at this time was anxious and expressive of pain and exhaustion; the tongue was pale and furred; the temperature of the skin cool; the pulse small and jerking; the vomiting had been incessant, and the irritability of the stomach so great that nothing was retained; the paroxysms of pain were frequent. The abdomen was soft and natural; but there was much tenderness complained of along the margin of the ribs and in the epigastric region on the least pressure, but this was evidently a soreness in the parietes, arising from the uninterrupted vomiting and irritability of the stomach. The right iliac and lumbar regions bore pressure without eliciting any increase of pain, nor was there any fulness or distension; but when pressure was made in the left iliac space and in the lumbar region of the same side, not only was a greater fulness perceptible than was natural, but the patient experienced an augmentation of pain, and of a character of which she was not previously conscious; every increase of pressure caused a darting, pungent, stab-like sensation, extending to the pubis. The enlarged and congested kidney could be distinctly traced, although the examination necessarily induced much suffering to the patient. There had been frequent attacks of colic during the night, with constant vomiting; the bowels had been relieved, but unless urine passed with the dejections, none had been made for the last ten hours. It did not appear that previously to this period micturition had been more frequent than natural, or that there had been any irritability of the bladder. Leeches had been applied to the abdomen, and calomel and opium had been given; but it is probable that the pills were not retained.

Taking all these symptoms into consideration, although there was no urine to assist the diagnosis, an opinion was given, which it was expected that secretion would confirm, that this was a case of renal disease, from the presence of a calculus in the kidney of the left side. The paroxysmal griping pains were those of nephritic colic, excited by the descent of calculous matter through, and consequent irritation of, the ureter of that side. Incessant vomiting is a constant accompaniment to such irritation. The antecedent condition of hæmaturia in this case afforded additional evidence in favour of this opinion. An examination of the urine was alone required to render this certain. The condition of the patient, expressed by the countenance, pulse, and tongue, forbad any further depletion. To allay the pain, and moderate the irritability of the stomach, were the urgent present indications. Accordingly, Battley's solution, in half-drachm doses, should be taken; every six hours warm and hot fomentations should be applied to the abdomen and loins; that iced soda-water should be sipped at intervals, to which might be added a teaspoonful of French brandy. So soon as the stomach could retain anything, the simplest forms of nourishment were suggested; and when medicine could be retained, amylaceous and other demulcents, in conjunction with moderate doses of hyoscyamus. A more extended plan of treatment could not be laid down till the character of the urine had been ascertained.

The opiate produced almost immediate relief; the irritability of the stomach, soon after the second dose, had decreased so much that some slight nutriment was retained; and free micturition had been established, so that a sample was obtained for examination. It was faintly acid, specific gravity 1·022; it was cloudy, of a light-fawn colour, and did not become clear when allowed to rest, but nevertheless it deposited a well-marked yellowish sediment. The upper portion, heated in a tube, became quite clear at a temperature of 80°; and then, before reaching the boiling point, again became cloudy; nitric acid being added, a granular precipitate, indicating the presence of albumen, was produced. The fluid also assumed a dark-bluish green colour, which as it cooled, became changed to a reddish orange. These characters indicated, first, the presence of urates in excess, easily soluble at the temperature of the body; secondly, the presence of albumen, which might be the associate either of blood or pus in the urine; and thirdly, a peculiar condition of the urinary pigment, by which the addition of nitric acid caused the fluid to assume a bluish colour. This abnormal pigmentary condition is often observed in the albuminous urine of those suffering from Bright's disease of the kidney; but it is by no means confined to the urine of that form of disease.

Examined under the microscope, numerous objects were presented to the eye. 1. Urate of ammonia in its usual granular form. 2. Vesical epithelium. 3. A few blood-discs. 4. Numerous large exudation-corpuscles, mixed with pus-cells in abundance. 5. Amorphous masses of fibrine stained with hæmatin, with many tubular coagula, free however from any entangled epithelium, and from their size, in all probability, formed in the straight uriniferous tubes of the cones. 6. Many irregular-shaped crystalline masses, highly refractive, and of an orange-yellow colour, exhibiting the character of amorphous uric acid; a few of them approximated to the lozenge and cylinder-shaped crystal of this acid. Grit was found in the sediment sufficient to impart a sense of roughness when rubbed between the fingers.

Here, then, was abundant evidence that the diagnosis had been correct; and that the hæmaturia in the early stage of the illness had been derived from the kidney. Amorphous fibrinous masses, as well as tubular coagula, moulded in the larger uriniferous tubes, proved unequivocally the source from whence the blood had been derived. The pus-corpuscles, and the albumen in the urine derived from the liquor puris, testified to the suppurative process perhaps about commencing; and the crystalline masses seen in the field of the microscope, as well as the sandy deposit amongst the purulent sediment, led to the conclusion that a calculous concretion within the kidney was giving rise to all these symptoms. The case was very expressive of the series of symptoms successively developed by the irritation of earthy matter formed and lodged within the cavity of the kidney.

### *Hæmaturia; renal colic from passage of a small uric acid ca culus; slightly purulent urine.*

CASE XLIII.—A lady, between 65 and 70 years of age, co sulted me for severe pain seated in the lumbar region of th right side, extending downwards to the hip and to the groin the same side. She suffered from distressing frequency micturition, and the urine had, during the last two days, b come dark-coloured and sanguinolent, which alarmed her.

A greater degree of fulness was observed in the region of th right kidney, and on pressure being made, a sharp dartin sensation was produced, which extended to the groin and nec of the bladder. For some time past she had felt this pai much increased in the carriage, or by any jar of the body. Th general health was not impaired; and except for the distressin frequency of micturition she would have slept well. The tongu was clean; the appetite moderate; but the bowels inclined t torpidity. Her general health had been good. Her mothe suffered from gout. The urine was tinged with blood, and few membranous shreds appeared in it. Blood-discs and som epithelium from the ureter and pelvis of the kidney were see by the microscope. The bicarbonate of potass and lemon-juice the most efficient remedy for the renal irritation from excess o uric acid, was prescribed.

In a few days the pain became aggravated. She was unabl to lie on the left side; there were great restlessness and violen paroxysms of a griping pain, with disposition to vomit. Th urine was free from blood, but the frequency of micturition con tinued. Some anodyne doses of morphia were ordered, an the potass and lemon-juice continued. Two days later, afte suffering during the night a most agonising attack of pain simulating colic, and then descending to the pubis, she graduall experienced relief, and had a few hours' composing sleep. O making water a small calculus passed, about the size of carpet-pin's head, which was found to be composed of uri acid. The pain to a great extent ceased, or only amounted t a certain degree of aching. The frequency of micturition also abated. The urine, however, now contained a small amount of pus. Cream of tartar drink was taken with advantage. The quantity of urine increased, and gradually became clear and free from pus. The last time it was examined, a few exudation corpuscles, some epithelium from the pelvis of the kidney, and one or two groups of epithelium from the bladder, were the objects seen.

The case is mentioned as an illustration of the simplest form of calculous disease of the kidney—it exemplifies the direction in which relief may be expected to come under the most favorable circumstances; and it was one of those cases in which the prediction of relief being possible after a sharp attack of pain was verified in three days after the opinion was given. When this lady was first told that her symptoms arose from a calculus in the right kidney, she was incredulous, for she had always believed and been told her symptoms arose from "liver." She was, moreover, alarmed, and wished to know the consequences. She was told that the most favorable result would be the escape of the calculus from the kidney; which, during its passage, would be attended by much increase of suffering in the shape of paroxysms of griping colic-like pains, and she was directed that if such should occur, carefully to examine all the water which passed. In a few days this favorable effort of nature occurred. She was much alarmed at the severity of her suffering, but her confidence was soon restored by the subsidence of the pain, and the escape of the calculus.

## SUMMARY OF SYMPTOMS DIAGNOSTIC OF CALCULUS IN THE KIDNEY; AND RENAL COLIC.

Great frequency of micturition, particularly at night, preceded by an aching distressing pain at the neck of the bladder, often referred to the extremity of the urethra, and relieved by passing even a small quantity of water. Pain more or less in the lumbar region, with a sense of aching or gnawing at the

crest of the ilium, with irregular sensations, often of numbn
or of heat, in the course of the external crural cutaneous ner
In the male retraction of the testicle. Occasional attacks
hæmaturia, slight in quantity, often excited by rough motio
as horse exercise, or jolting in a carriage, or even walking
rough ground. Urine becoming more or less cloudy from t
presence of mucus, never becoming ropy; gradually assumi
a milky appearance when passed, and forming, on settling,
distinct sediment of pus-cells. The pain increased on bodi
motion may eventually change its character and becon
paroxysmal, or colic-like, accompanied by retching and eve
frequent vomiting. These symptoms, after very great aggr
vation, may suddenly cease, and be followed by those of ston
in the bladder, or the calculus may in either sex, but partic
larly in women, pass through the urethra, and be found in th
excreted urine. In the first stage of calculous pyelitis there
no renal tumour, although sometimes pressure in the lumb
space may cause a darting pain thence in the direction of th
pubis and neck of the bladder.

The microscope reveals at first mucous corpuscles and epith
lial cells from the calyces and pelvis of the kidney and ureters
subsequently pus-cells in abundance, free and not coalescin
Various crystalline forms of uric acid and oxalates; and in uri
kept till it becomes alkaline, prisms of the triple phosphate.

# CHAPTER V.

## RENAL ABSCESS FROM CALCULOUS DISEASE, OR STONE IMPACTED IN THE INFUNDIBULUM.

In calculous pyelitis the urine has a free passage through the ureter, together with the mucus and pus which the presence of a calculus lodged in one of the calyces excites. This calculus may, and often does, get displaced, and finding its way to the pelvis of the kidney, passes into the infundibulum, and, with symptoms of renal colic, may get through the ureter into the bladder. On the other hand, the calculus dislodged from its original position may either from its composition, or by its irregular shape, be unable to pass beyond the infundibulum, where it becomes fixed. It now offers an obstacle to the free passage of the urine, as well as the mucus and pus excited by its presence. These accumulate and are retained till a sufficient dilating force opens a passage for a portion of the obstructed fluids. Renal abscess from a calculus impacted in the pelvis of the kidney is accompanied by intermissions of the purulent discharge, and freedom for days together of pus in the urine. There are many points of interest in such cases, and the following will illustrate the most characteristic symptoms of this form of renal disease.

Case XLIV.—Mary Anne C——, aged forty-one, was admitted into the Westminster Hospital, suffering apparently from obscure symptoms of dysentery. She was treated, in my absence from town, for the diarrhœa which had been present for three weeks before admission. I did not see her till the first week in October, when I was at once struck with the presence of pus in the urine, which she stated had been present in greater or less quantity for a long time. Upon making an

examination of the abdominal region, a greater fulness in t
left lumbar space was detected, and accompanied by doubtf
evidence of fluctuation. Pressure caused a sense of pain in t
direction of the left groin, and at the bottom of the pubis.
am indebted to Mr. Middleton, the clinical assistant, for t
following history before admission. It suggests the probabili
of a vesical calculus at one period; but in this the patient
account as to the sequel of the symptoms of calculus in t
bladder is obscure. She stated that she lived in the We
Indies for three years, returning to England in October, 185
During her residence in the West Indies she appears to ha
suffered from dysentery, as well as from some disorder of t
functions of the bladder. Her statement is, that she suffere
from retention of urine and difficult micturition for some week
The urine was drawn off in small quantities from time to tim
by the catheter, at which period much constitutional disturbanc
with fever, occurred. At that time her life was despaired o
The urine, she stated, was always ropy, and could be drawn i
shreds, and the bladder was frequently washed out with inje
tions of warm water. In the midst of her sufferings she su
denly experienced a sensation as if something had given wa
which was followed by the discharge from the bladder of
quantity of viscid, red, and purulent-looking fluid, and whic
continued in daily decreasing quantity. This gave her gre
relief. After her return to England in October, 1858, s
continued to suffer severe lumbar pain, particularly aggravat
on walking, or on the body being jarred in any way. Th
was accompanied by a yellow deposit in her urine. S
stated that during the past year she had suffered fro
dyspeptic symptoms, of which pyrosis appeared the most pr
minent. During the month of August she suffered fro
diarrhœa, with pale-coloured dejections, stated to have be
shreddy and mixed with blood. In my absence she w
treated for these symptoms; copious bulky fæcal dejections fo
lowed the treatment adopted by Dr. Fincham, from which s
experienced much relief. It was in the first week of Octob
that, finding she complained much of a constant severe pain

the left lumbar region, an examination of the abdomen was made, and the urine found to contain a notable deposit of pus. The examination of the abdomen demonstrated the following conditions :—The symmetry of its outline was not disturbed to the eye as regarded the anterior aspect; laterally the hollow of the lumbar space of the left side was less, and appeared fuller than the opposite. Percussion at this period did not develop anything unusual. Grasping the lumbar space with the right hand, and making steady pressure with the thumb in front, caused considerable pain, amounting almost to a sense of sickness and faintness. No sense of fluctuation could be detected at this time. She stated that she had frequently experienced an aching pain at the crest of the ilium of that side, with a feeling of numbness extending down the thigh, in the direction of the external cutaneous crural nerve. She was occasionally troubled with frequency of micturition, and pain at the neck of the bladder, relieved, however, by the passing of urine. This fluid, when set at rest, separated into an upper, perfectly clear, and natural-looking urine, and a sediment, yellowish in colour, and creamy, but perfectly limpid in consistence. This, to the ordinary chemical reagents, and to examination by the microscope, afforded proof of its being pus. The clear supernatant urine was slightly albuminous, from the admixture with the liquor puris. That the bladder was not implicated was inferred from the absence of ropiness and mucosity from the urine, and the separation so readily from the pus as a distinct, well-defined sediment. Some epithelium from the ureters was once observed, but nothing else but pus-cells have ever been detected by the microscope. The opinion then formed was that there was a renal abscess from a calculus impacted in one or both kidneys. At that time the urine was continuously purulent; each micturition contained pus. Although the direction of the symptoms led to the opinion that the left kidney was the more severely implicated, it was impossible then to pronounce, as the sequel enables me to do, that the right kidney was free from disease. She was ordered ten grains of Dover's powder each night, and to take the decoction of uva ursi three times a day. There was some apparent improvement at fir but after taking the astringent for three days, some blo appeared in the urine, and it was discontinued; it was resum on the 14th of October, the purulent deposit remaining unc minished, but the patient becoming much freer from pain, a ostensibly improving in all other respects. There was, howev acute pain in the left lumbar region, and much aggravated pressure.

And now (Oct. 28th) commenced a series of symptoms whic when read rightly, afforded a most intelligible explanation, n only of the disease itself, but of the course it would probably ru The urine continued undiminished in quantity, but there was *sudden,* not gradual, but sudden and abrupt disappearance all purulent deposit. The urine was perfectly natural; not trace of albumen, or cell-form, except vesical and urethral ep thelium. But step by step with this visible return to health urine, the sufferings of the patient increased; the left lumba region became sensibly fuller; the left iliac space filled up; th abdomen became larger on the left side, and unsymmetrica A distinct sense of fluctuation could be detected, and the mo acute suffering was induced by making pressure on the le side, the pain always darting pungently to the pubis in th direction of the neck of the bladder. There was some febri disturbance, which was only partially allayed by diaphoretic fomentations, and sinapisms. She found relief from large dos of opium, Battley's solution being the preparation employe There could be no doubt now as to the explanation of thes symptoms. The left kidney was the seat of a calculus, whic up to this period, had, in all probability, been retained eith within the calyces, or in the upper part of the pelvis of th kidney, where its presence had caused a daily, continuous, an unobstructed flow of pus mixed with the urine. This calculu becoming displaced, and lodged in the infundibulum, had blocke the entrance to the ureter, and caused the purulent secretion become suddenly arrested. The urine was then no longer puru lent; on the contrary it was natural and healthy. We inferre therefore, that the right kidney was free in its functions, an healthy in its secretion. But corresponding to the abrupt disappearance of the pus from the urine, there was a slow but palpable increase of a fluctuating tumour in the position of the left kidney, and which produced an accompanying amount of suffering of the patient. Remedies failed to give relief, except the blunting influence of the narcotic, which produced a temporary lull to the anguish, darting and stabbing and shooting downwards, in the direction of the ureter to the neck of the bladder. Micturition was at this period very frequent, and there was much pain both before and after passing urine, with a pungent pain down the left hip and thigh.

These symptoms continued without any but temporary mitigation to November 10th, when pus began to reappear in the urine. On this day she experienced relief; the urine exhibited distinct evidence of the presence of pus. The perspiration, which had been excessive at night, subsided, and there was less tenderness and fulness in the left lumbar region.

On the 11th and 12th November, the report spoke favorably of the change of symptoms: the bowels were very loose; the tongue was natural; pulse moderate and soft; and the appetite improved. The lumbar region was much decreased in fulness, and there was but little pain caused by pressure; the amount of pus in the urine increased daily. These favorable symptoms continued to November 15th, when the urine became scanty and clear.

On the 16th, the fulness of the left side had notably increased, and there was much increase of suffering; shivering was complained of, and profuse perspiration again broke out at night. Fomentations with hot flannels and opiates temporarily relieved her sufferings.

On the 21st of November pus again made its appearance, and with a similar modification of the symptoms.

The urine continued purulent till the 26th, the lumbar region decreasing in fulness, the bowels remaining very active, and the sufferings of the patient materially relieved.

This state continued up to the evening of the 1st December; the patient had voluntarily omitted the opiate, and her appear-

ance justified the conclusion that for several days she had be
free from pain or uneasiness. On the evening of this day t
urine again became clear, and lost all trace of pus, which w
immediately associated with a sense of tightness and distre
and tenderness in the left lumbar region. Sympathetic pai
extended to the crest of the ilium, to the groin, and symphy
pubis.

On the 9th, her sufferings were once more relieved by t
presence of a copious deposit of pus in the urine, which co
tinued for five days; the report of the 14th stated that t
urine was quite clear, and the patient exhibited returning sig
of pain, which had now been so regularly associated wi
absence of pus in the urine and increase of the renal tumou
that the reappearance of the purulent deposit was looked for
the only certain source of relief to her sufferings.

This state continued to December 28th, the urine for t
fortnight preceding this date never becoming more than slight
hazy by the presence of pus-corpuscles. The renal tumour h
during this interval increased much in size. There was a mu
greater prominence of the abdominal wall to the left of t
umbilicus. The lumbar or iliac space was filled up; and di
tinct fluctuation could be detected. Percussion produced mu
pain, and any amount of pressure excited a sensation of
stabbing character in the direction of the pubis. To the rig
of the umbilicus the natural resonance of the abdomen existe
on the left the absence of resonance was less extended in co
sequence of the flatulent state of the large bowel. On the mor
ing of this day, pus began to appear in increasing quantit
and throughout the day was estimated at more than a pint.

The urine on the morning of the 29th was opaque an
milky, or rather of a creamy, yellow appearance; and whe
set at rest, it afforded a deposit which occupied more than ha
the glass. This great augmentation in the purulent discharg
brought a proportionate amount of relief to the patient: sh
slept better that night, and was much freer from pain. Th
tongue was clean, the pulse quiet and natural, and the appeti
moderate. The bowels continued much relaxed, but there w

no appearance of pus in the dejections. The abdominal walls were not so tense as two days since, but were soft, although prominent and tympanitic.

The nature of this case could not be mistaken: it was an abscess of the left kidney, originally excited by the presence of a calculus. The disease commenced with symptoms of calculous pyelitis, or calculous nephritis—it was impossible to say which, as the early history of the symptoms of the patient was imperfect. From the moment, however, that attention was drawn to the state of the urine, with the accompanying symptoms, no doubt existed as to the origin of the pus, or the nature of the disease; but the subsequent progress of the symptoms was remarkable for the additional aid it afforded to a correct diagnosis. If urine present an opaque, milky, or cream-like appearance when passed—is limpid, and not viscid—readily separate into an upper clear portion, which is albuminous, and a lower pale-yellow sediment—if that sediment, by the addition of liquor potassæ, be converted into a ropy gelatinous magma—if the microscope exhibit numerous corpuscles, which the addition of acetic acid develops into a well-marked cell-wall, with a trefoiled or reniform nucleus—then it may be certain that pus is present in the urine. The next point is to determine its source. It might be derived from the urinary passages, the bladder or the kidneys. If from the urethra, evidence of local irritation is not difficult to obtain; moreover, the quantity of purulent discharge is never sufficient to form any very notable sediment. The microscope would exhibit the presence of pus-cells; but the number would never give to the urine an albuminous reaction by heat and nitric acid. Urethral disease is therefore excluded. But the bladder may be the source. Now, apart from the symptoms which are peculiarly characteristic of vesical inflammation and irritation, the urine always exhibits a peculiarity which is a valuable guide to the practitioner. In all cases of vesical mischief, whether from the presence of calculus, or gouty inflammation, or simple catarrh of the bladder, the urine, as quickly as it enters the bladder, undergoes partial decomposition. The epithelium and mucous or exudation corpuscles set

up a rapid molecular change in the urine; it quickly loses
acidity; it becomes neutral, or positively alkaline; and t
state rapidly disintegrates the cells, their walls are dissolv
and the contained mucus set free; the whole fluid becom
viscid, tenacious, and ropy, and, poured from one vessel to a
ther, exhibits a similar viscidity to that produced on pus
the addition of liquor potassæ. The urine is frequently in t
state before it leaves the bladder; more frequently, however,
becomes so within an hour or two of its excretion. In su
urine abundant prismatic crystals of the triple phosphate
always visible, from the rapid crystallization of this salt fr
neutral urines. The state and appearance of the urine, the
in the case above related, exclude the bladder as a proba
cause. Experience teaches, that renal abscess, from whate
cause, produces the largest and most characteristic supply
pus in the urine. When the kidneys become the seat of calc
lous deposit or of tubercular infiltration, pus is formed in abu
dance; in the latter disease, in a continuing and gradually au
menting quantity, accompanied by rapid emaciation and dea
by exhaustion: in the former, by the presence of pus interm
ting in quantity, the urine occasionally being clear, and t
general condition of the patient not deteriorating to any mark
extent; the loss of strength and flesh being often not ve
marked, and never in proportion to the amount of pain exp
rienced by the patient. The urine is opaque and turbid; b
it is always fluid and free from viscosity when passed. It
faintly acid in its reaction, and the clear supernatant stratu
yields proofs of the presence of albumen derived from the liqu
puris. The action of liquor potassæ on the sediment is ve
characteristic. The opaque, turbid deposit gradually becom
clear, and acquires an appearance and viscidity strongly rese
bling white of egg as it pours from the shell. This viscidi
is caused by the solution of the cell-wall in the alkali, a
the escape of the contents of the cells in the form of muci
Not until the lapse of many hours do any crystalline for
appear in the purulent fluid derived from the kidneys; th
the prismatic crystals of the triple phosphates are formed, t

result of the molecular changes produced by decomposition; such as happens, only more slowly, in healthy urine.

These, then, are the characteristic appearances of purulent urine proceeding from mischief in the kidney. Now let me examine the symptoms which more particularly demonstrate the source from which the pus is derived. Frequency of micturition, and pain preceding micturition are of common occurrence. These symptoms are, however, common to most diseases of the kidney—whether the inflammatory stage of acute albuminuria or the more chronic progress of the same disease. Nevertheless, the pain referred to the neck of the bladder or extremity of the urethra—relieved by micturition, and acquiring intensity as small quantities of urine collect in the bladder—is more marked in those diseases of the kidney which are accompanied by the formation of pus. The next most characteristic symptom is the lumbar pain, with its associated sympathetic states of branches of the nerves derived from the lumbar plexus. The pain referred to one or other side of the loins is, even in the early stage of these complaints, aggravated by pressure; and also by anything which suddenly jars the frame, such as walking on uneven ground, jumping, riding, either on horseback or in a carriage over a rough road. An aching sensation is often referred to the crest of the ilium, to the groin, or to the pubis; and frequently there is numbness down the outside of the thigh, and, in the male, retraction of the testicle on the side of the diseased kidney. Such symptoms as these are symptomatic of calculous disease of the kidney. A calculus may be, and often is, formed and impacted in one of the cup-shaped involution of mucous membrane surrounding the apices of the cones—*the calyces*. Here it gives rise to all or most of the above-enumerated symptoms. But so long as it is confined to that spot, the purulent secretion occasionally by its presence has a free outlet, and the kidney undergoes no enlargement; but a simple pouch-like cavity is formed in which the calculus is retained. But frequently one of two events follows; either the calculus becoming disengaged from its position, escapes into the infundibulum, and, if not too large, passes down the

ureter into the bladder, with, in some cases, well-marked sym
toms of an aggravated colic; though in others, this is not ve
apparent. The calculus may now either increase in size
apposition of layer on layer of uriniferous deposit, with all t
characteristic signs of stone in the bladder, or, in some cas
particularly in females, it may escape, after giving some tro
ble, through the urethra. There is, in the history of the abo
case, some obscure and doubtful evidence of such vesical troub
having occurred in the West Indies, when she passed ro
urine, and when the bladder, according to her account, was fr
quently injected with tepid water. The other event is that th
calculus, either originally too large, or rapidly increasing i
size, for the most part by the accretion of urate of ammoni
and phosphatic salts on its surface, becomes too large to pa
down the ureter, but is fixed and lodged in the infundibulu
or pelvis of the kidney. The larger the size of the calcul
the more abundant the secretion of pus; and also the mo
complete will be the obstruction to the free escape, n
only of the purulent matter, but also of the urine formed
the secreting portion of the organ hitherto uninjured. As th
calculus grows, the impediment increases; and now a slow an
gradual dilating force begins to be exercised by the accumula
ing contents, and a renal tumour becomes apparent; sligh
fluctuation is perceptible in the lumbar space: the pus, b
degrees at first, but in subsequent stages often suddenly, ceas
to appear; and corresponding with this disappearance there
an increase in the size of the renal tumour, and a considerabl
aggravation of the patient's sufferings. But the dilating forc
going on within the kidney exercises often, and frequently i
the early progress of such cases, such an expansive power as t
cause the obstructed canal partially to yield and permit th
escape of the urino-purulent contents of the now sacculate
kidney. Relief follows, and continues as long as the discharg
continues. Ultimately, however, in many cases, the passag
of the ureter becomes permanently closed. The dilating forc
proceeds till all vestige of secreting structure becomes oblite
rated, and the wall of the sac consists of the cortex of the kidne

only, the cones or mammary bodies being entirely lost, or only obscurely to be traced. In other cases, the patient dies before the dilatation has reached this extent, and the kidney presents the appearance of pouch-like enlargements, corresponding in number to the calyces. The former cases are rare; but I have known a temporary cure established by the opening of the sac by ulceration into the contiguous intestine, either the ascending colon, or the sigmoid flexure, according as the disease has been in the right or left kidney. A copious, sudden, and, for the time, exhausting diarrhœa, emptied the sac, and caused its subsequent collapse and condensation.

The case under consideration presents all the symptoms, both objective and subjective, which are pathognomonic of renal abscess from the presence of a calculus. The state of the urine, its purulent character at one time, followed by subsidence of the fulness in the lumbar region and a mitigation of symptoms; the cessation of the purulent drain, and a corresponding increase of fluctuation in the left side, and aggravation of suffering; the obscure history of some renal and vesical disorder in the West Indies; a period when any sudden jar caused a darting pain in the left kidney; together with the sympathetic states of those cutaneous branches of nerves derived from the lumbar plexus, constitute a category of symptoms which may be considered decisively pathognomonic of abscess of the kidney from the presence of a calculus. Is it not a little remarkable that the general health of such patients should apparently suffer so little? Years passed on, and although their sufferings are at times acute, yet neither loss of flesh nor appetite becomes very apparent. This will, of course, largely depend on the judgment with which they are treated; but with moderate care life may be prolonged and considerable relief obtained from the pain, which recurs most poignantly at the periods of the disappearance of pus from the urine. There is yet one other condition in this case worthy of remark; it is the perfectly natural state of the urine at those periods when the pus disappears, and the tumour begins to increase in size. The natural inference from this fact is, that the right kidney is free from disease, and capable, for the present at least, of performing the depurating office of discharging from the system the excrementitious constituents of the urine.

### HÆMATURIA, PURULENT URINE: RENAL ABSCESS: DEATH.

The diagnostic symptoms of renal abscess, from the presence of a calculus, are of much practical importance. It may be said of this disease, as indeed may be said also of almost every malady, that each individual case is a separate study, and that, carefully examined and recorded, every case furnishes some feature different from its fellows. There is sufficient similarity of symptoms to prove the family alliance; there are the broad characteristic features which at once proclaim each to belong to the class of renal disorders; there are the diagnostic conditions which determine the existence of renal abscess; but the course which that abscess takes, and the rapidity of the progress which the patient makes towards the modified cure which almost invariably follows, vary materially in individuals; and this difference constitutes a very important element of study and observation; for it is by collecting and examining the discrepancies of individual cases that general laws are educed, and our practical knowledge extended. Before detailing the particulars of another case, I may enumerate the signs which may be considered as pathognomonic of renal abscess. The urine is more or less purulent, constantly or intermittingly; there are frequency of micturition, with pain or irritation at the extremity of the penis, or neck of the bladder, momentarily relieved by the passage of urine. Various sympathetic sensations, extending from the loins to the crest of the ilium, or in the direction of the ureters, and often altered sensibility of the surface in the direction of the external crural cutaneous nerve; in the male, retraction of the testicle; in both sexes, more or less evidence of the presence of a fluctuating tumour, in the position of one or other of the kidneys. Such are the usual symptoms of renal abscess, preceded by a history more or less characteristic of renal disorder, in which hæmaturia occupies a prominent place.

Case XLV.—John C—, thirty-eight years of age, an excavator, was admitted into the hospital on July 4th, suffering from pain across the loins, frequency of micturition, and urine having an abundant sediment of pus. I am indebted to my clinical clerk, Mr. Mouatt, for the following history and notes of this case. The patient stated that six years since he suffered from a severe attack of hæmaturia, which, with intermissions, lasted ten months; it was accompanied by much constitutional disturbance, and appears to have been followed by perineal abscess, the cicatrix of which is still apparent. He rapidly recovered, and continued to enjoy good health till within the last four months. His symptoms consisted of some pain in the left lumbar region, extending diagonally downwards to the inguinal region of the same side, with an aching, gnawing sensation in the crest of the ilium, proceeding downwards in the direction of the external crural cutaneous nerve. Micturition was very frequent, accompanied by a pain distinctly referred to the neck of the bladder, which was relieved by voiding urine. There had been a drawing up of the testicle of the left side; there were cicatrices of abscesses in the left lumbar space; there was a trifling degree of fulness in this spot; but there was apparent elasticity and obscure sense of fluctuation in the region of the left kidney—pressure and manipulation here induced pain, shooting downwards to the symphysis pubis. There was but little constitutional disturbance, some thirst, but the appetite was good, and the functions generally, except those of the kidneys, appeared to be naturally performed. The urine collected and set at rest threw down a dense, yellow, creamy sediment, occupying about one sixth of the glass. The separate urine was cloudy, of a pale colour, faintly acid, of a specific gravity 1·009, and albuminous. The sediment afforded the usual characters of pus, when treated by liq. potassæ, and examined by the microscope. The history of this patient gave no evidence of a calculus ever having passed from the kidney. He was ordered opium at bed-time, gallic acid three times a day, and a moderate diet. The opium gave great relief to the suffering of the patient, and the urine increased in quantity, became very pale, and apparently less purulent. During the first week no material alteration of symptoms took place; the opiates lulled the pain, which the patient described as not so pungent or severe; but nevertheless there was a constant dull aching over the left kidney. The purulent sediment had daily decreased in amount, so that on the eighth day from admission a very small sediment formed at the bottom of a conical glass; the urine in other respects remained the same, very pale, cloudy, acid, and albuminous. The amount of urea and uric acid was less than the usual proportion. The left lumbar space now gave evidence of swelling, and increased sense of fluctuation; it bulged outwards palpably to the sight. The urine remained the same in quantity, but with a very minute quantity of pus-cells. There now appeared symptoms of constitutional disturbance. There was a hectic flush on the cheeks; the pulse became more frequent, but feeble, small and thin; the tongue had a tendency to become dry; there was feverish heat of skin and thirst, and complete loss of appetite. He was ordered some wine.

On the 13th of July, nine days after admission, the swelling of the left lumbar space had so much increased, that the course of the renal abscess outwards to the loins became no longer a matter of conjecture. Some days previously, as the pus in the urine daily decreased, and the patient suffered proportionately from lumbar uneasiness, accompanied by evident increase of the renal tumour, the probability of the abscess taking a direction outwards was predicted, as the patient stated that he had suffered from abscess in the loins on a previous occasion, and under similar circumstances of suffering to the present. On the 14th, Mr. Power, at my request, opened by lancet the abscess, and more than two pints of a yellowish-green, mawkish, but very offensive purulent fluid escaped. The urine continued unaltered in quantity, and with very little sediment. He was put on an increased allowance of wine, a tent was put into the opening to prevent its closure, and the position of the patient was regulated as much as possible to favour the discharge. The patient experienced marked relief by the opening of the abscess; he took nourishment freely, and with advantage. The urine continued of the same remarkably pale colour, slightly albuminous, and of sp. gr. 1·008.

During the succeeding ten days there was very little to remark, except the variation of the amount of the discharge from the opening. At first the quantity was copious, and discharged freely; then one day differed from another—sometimes scanty, sometimes abundant—and then it became gradually and permanently less. During this period the urine remained pretty constant in quantity and quality, more deposit appearing as the discharge from the abscess decreased.

On the 19th there was slight fever, a rigor in the evening; there had been but little discharge during the preceding twenty hours: but with an increase in the flow from the abscess these symptoms disappeared. He continued to take nourishment well, full diet, porter and wine.

On the 23rd, the left foot became œdematous, and it was feared that some obstruction to the venous circulation was threatening; but this subsided, and by the end of the first week of August the wound was nearly closed, and the discharge amounted to little more than a spoonful of a thin purulent fluid. But as the flow from the wound decreased, the purulent deposit in the urine again increased; and this state of alternate increase and decrease continued: so that whenever the discharge from the opening in the loins was abundant, pus almost disappeared from the urine; and, on the contrary, when the abscess exhibited a tendency to close, the urine contained what would have found vent in the loins.

On the 14th of August, in many respects his condition had improved. He was able to get up daily; he thrived on his diet, and his improved appearance testified to the advantages of a nutritive diet and a moderate amount of stimulants.

For several days, remarkable alternations in the progress of the symptoms occurred. One day the pus in the urine would increase in quantity, while the discharge from the opening in the loins proportionately decreased; then the contents of the renal abscess would find chief vent from the back, and the urine would remain nearly free from pus. It became quite clear, from the state of the patient under these alternations, that though the ureter permitted the pus to find an outlet through the bladder and urethra, yet that when the abscess discharged freely from the back, his condition was better than when the urine was loaded with pus. In the latter case he was always restless and uncomfortable, and the appetite fell off; in the former, he became brisk and cheerful, and the digestive organs active and healthy. It was, therefore, highly desirable to keep open the outlet in the back, and encourage from it a free discharge. A portion of a gum-elastic catheter was placed in the opening and secured there, but, after a few days, was removed, the patient believing the discharge to be less than when the opening was left to itself. For several days a free discharge continued; but on the 28th of August the pus in the urine augmented rapidly in quantity, and scarcely any discharge took place from the back. He lost his appetite; the pulse became rapid, 106; the tongue dry, and inclined to become brown; and diarrhœa set in.

In the beginning of September, the disposition of the opening to close was so great, that the introduction of a probe to determine the direction of the chief sinus, with the object of keeping the channel open, was resorted to, but without succeeding in bringing back the discharge in this direction. In the middle of September, however, we succeeded in getting the abscess once more to discharge from the loins. On the 18th of September, however, the pus ceased to flow; and on this occasion there was no appearance of any return of pus in the urine. Diarrhœa returned; the pulse rose in frequency; the skin became hot, the tongue dry; there was great thirst, and total loss of appetite. The left lumbar region sensibly increased in volume; the abdominal walls became distended; the urine small in quantity, quite clear, and free from purulent contamination. An unsuccessful effort was made to re-establish the discharge from the back. The countenance became anxious, and of that peculiar aspect so constant in all peritoneal or abdominal disorders. The pulse failed at the wrist, the skin became cold and clammy, the vital powers rapidly failed, and he died on the 22nd of September. All efforts to obtain a post-mortem examination were, unfortunately, unsuccessful. The treatment during the past three weeks had been simply palliative, opiates being the most valuable and efficient.

This case is a good illustration of two of the contingencies attendant on renal abscess. I may repeat that pyelitis invariably terminates in what may be conveniently termed renal abscess. Now, whether the disease be in its origin calculous nephritis, scrofulous or tubercular, the formation of pus invariably follows. In the latter forms, however, there is usually but one mode of termination The purulent state of the urine continues uninterrupted, and the patient sinks from hectic and exhaustion.

But this is not the progress of that form of the disease which originates in calculus of the kidney. After a longer or shorter interval, the calculous concretion, not having escaped in its early period through the ureter into the bladder, begins to increase by fresh deposit; and by its increasing volume to add almost daily, by the irritation it creates, to its size. The urine at first containing what appears to be an unusual amount of mucus, soon becomes purulent. So long as the urine continues purulent, the outlet through the ureter is unobstructed; but after a time it is noticed that the urine is far more purulent one day than on another. This marks the commencement of the period when the ureter is obstructed from impaction of the irregular-shaped calculus in the infundibulum of the pelvis of the kidney. As the pus and urine accumulate, they exercise a distending force, and once more the pus and urine escape into the bladder. At this period the patient will always be free from uneasiness or trouble so long as the urine is purulent, but gives evidence of distress so soon as the urine becomes clear. In fact, during this interval the secretion of but one kidney finds its way into the bladder. But a time comes when the obliteration of the channel becomes complete, and neither pus nor urine find their way from the diseased kidney; an encysted abscess results, and to the contingencies which await this abscess I desire now to direct attention.

1. The renal tumour increases slowly, giving rise to a marked constitutional disturbance, characteristic of internal abscess. The pus begins to burrow in the direction of least resistance, and finds a way for itself posteriorly through the substance of the loins, and a distinct fluctuating swelling is produced, which should be immediately opened, as the ulcerative process, if left to itself, protracts the patient's suffering.

2. The abscess, instead of taking this direction outwards, may establish a communication between the ascending or descending colon, as the abscess is situated in right or left kidney. Diarrhœa follows, with immediate reduction of the renal tumour, and gradual improvement in the condition of the patient.

3. The abscess may fail to find a way so salutary as either of these; it ulcerates its way into the cavity of the peritoneum, and the patient sinks rapidly, with symptoms of fatal peritonitis.

4. There is, however, one other contingency, and perhaps the most common. The effect of the partial and temporary obstruction to the escape of the pus and urine from the affected kidney is to produce an expanding or dilating force on the kidney. This causes the organ to become at first slightly sacculated; when perhaps the communication between kidney and bladder is re-established for a time, and the dilated state partially collapses. Again obstruction exists, again dilatation takes place, and the organ becomes yet more sacculated. The renal structures, the tubuli uriniferi, and the convoluted tubes of the cortical layer, become more and more obliterated; and ultimately the calculous kidney becomes a mere sacculated pouch, with not a trace of secreting structure remaining. This is the process which may be looked on as a spontaneous cure; and provided the other kidney continues healthy, such patients live without suffering, and reach an average age.

The museum contains specimens of such kidney: one from a patient of sixty-six, the other of seventy years of age, who had severally renal symptoms for more than thirty years.

In the case I have just detailed, two of these contingencies occurred which I have now named. At first the abscess opened outwards, and brought with the escape of the pus and urine relief and ease to the patient. But from circumstances which we can but conjecture in the absence of post-mortem proof, the external outlet exhibited a marked disposition to close up and heal; and ultimately failing to re-establish this outlet, the abscess found its way into the abdominal cavity, and rapidly led to a fatal termination.

## SUMMARY OF SYMPTOMS DIAGNOSTIC OF RENAL ABSCESS FROM STONE IN THE KIDNEY.

The differential diagnosis between renal abscess from calculus impacted in the infundibulum of the kidney and calculous pyelitis is of importance.

In the latter the passage through the ureter continues free, the calculus being lodged in one or other of the cup-shaped envelopes of the cones, and excites irritative action called pyelitis. The calculus may at any time become displaced, and if not too large escape down the ureter into the bladder. See calculous pyelitis.

In renal abscess, however, the stone has become permanently lodged in the infundibulum or head of the ureter, has become branched, and of irregular shape by addition, and is permanently impacted in its position.

In renal abscess, to all the symptoms of calculous pyelitis must be added evidence of a tumour in the region of the kidneys. Purulent state of the urine intermittent, the prominence of the tumour varying with the proportion of pus in the urine. Aggravation of pain and suffering in the intervals when the urine is comparatively free from pus, with recurring increase in the renal tumour. Microscope reveals little else but pus-cells, occasionally crystals of triple phosphate, uric acid, and oxalates. The explanation of these conditions is given in the case illustrative of renal abscess (q. v.).

## CHAPTER VI.

### SUPPURATIVE NEPHRITIS—TUBERCLE OF THE KIDNEY.

*Scrofulous pyelitis—Tubercle in the kidneys, bladder, and pro tate—fistulous opening between the bladder and rectum.*

NOTWITHSTANDING the success with which the urine has bee studied, in relation to the diagnosis of most affections of th kidney, there are, nevertheless, diseases rare in their occurrence, which will, and perhaps ever must, present almost insurmountable obstacles to a correct diagnosis.

Tubercle in the kidneys is a disease of this character. It i of comparative infrequency.

If the history of a single case does not assist in clearing awa all the difficulties of a correct diagnosis of tubercular disease o the kidney, it will nevertheless exhibit the leading features together with some of the complications which may arise in this form of renal disease. I may observe that the difficulty o diagnosis is not as to the seat of the disease, or the organ affected, but as to the nature or special form of the disease affecting the kidneys. The existence of suppurative nephritis is obvious in these cases. But what causes the suppuration? Many of the symptoms are those of calculous pyelitis. A sacculated and enlarged state of kidney may be made out; but these may arise from calculous disease. There is nothing in the urine that would lead to the suspicion of tubercle.

Organic granular matter insoluble in hydro chloric or acetic acids, associated with pus in the urine, has been thought characteristic of tubercle in the kidney; but more or less of this granular material is always present with pus-cells in abundance. The following case may be given to illustrate these remarks.

CASE XLVI.—J. W—, æt. 29, a carpenter, was transferred from the care of Mr. Charles Guthrie, and admitted into Burdett ward, on the 18th May, 1855. He came under the care of that gentleman, suffering from irritable bladder, and doubtful symptoms of calculus. He was examined by Mr. C. Guthrie, Mr. Holt, and Mr. Brooke, and they were unanimously of opinion that there was no stone in the bladder, nor stricture, nor disease of the prostate. While under surgical treatment, samples of his urine were twice sent to me for examination. On the first occasion, the urine was faintly acid, slightly albuminous, natural in colour, and deposited, when set at rest, a faint flocculent cloud; there were also small membranous shreds, one or two of which contained minute coagula of blood. Under the microscope, there were seen the large pavement epithelial cells in abundance; many blood-corpuscles; some fibrinous coagula, quite amorphous, but stained of a reddish yellow; and a few of the smaller, spherical, glandular, epithelial cells. The bottom of the glass vessel in which the urine had remained contained a few membranous shreds, which felt gritty, and which readily dissolved in dilute hydrochloric acid. The patient described his symptoms as of about some seven weeks' duration; he could not account for their origin, but described them as commencing with severe lumbar pain, of a sharp, pungent character, followed by frequent desire to pass urine, and inability to retain but a small quantity. This was followed by severe paroxysms of pain, referred to the perinæum and canal of the urethra. The irritability of the bladder increased; he passed urine every hour, day and night: he said he had seen very minute threads of coagulated blood, and the house-surgeon stated that he had once noticed the urine of a dark chocolate colour: and a few days before he was transferred, it became opaque and milky. As the pain became more urgent and distressing his bodily strength failed, and he rapidly lost flesh. While under Mr. C. Guthrie's care, he had been cupped in the perineal region; he had taken also diuretics, with liquor

potassæ ; opium and ether had also been given ; but from
of these remedies did he experience any relief. On being
ceived into Burdett ward, the following were the chief sy
toms recorded in the ward-book : there were great phys
exhaustion and debility, much emaciation, and a carew
anxious expression of countenance. The pulse was small
weak, the respiration natural, the tongue slightly coated, to
bowels, deficient appetite, craving thirst, and profuse
exhausting perspirations. The patient complained of ur
pain, referred to the hypogastric region of the abdomen,
accompanied by darting, stabbing paroxysms in the perinæ
This pain, the patient stated, was temporarily relieved by mi
rition, that for a few minutes afterwards he was comparati
easy, but that the uneasy sensation then commenced, and
tinued augmenting in intensity till the distress became
urgent, and was again temporarily suspended by voiding the s
amount of fluid collected in the bladder, which seldom excee
one or two ounces. The pain was not increased by walkin
exercise, he had never known the urine to stop suddenly, an
was quite clear that the only interval of ease that he experien
was immediately after micturition. He had for many weeks
fered from a constant fixed pain in the small of the back, to
right of the spine, and referred to the posterior crest of
ilium. There was a greater degree of fulness in the right lun
region than in the left, and pressure made on the former,
grasping this region with the right hand, the thumb resting
the lumbar muscles, and making pressure on the abdom
wall with the fingers, excited an increased amount of pain.
obscure sense of limited fluctuation was also elicited out of
same region. These conditions was absent on the left side.

The urine passed last night was milky and opaque, wh
character the patient now stated he had noticed during the
week. On being set aside it separated into two portions :
upper, slightly clouded, but otherwise natural-looking urin
fluid ; and a lower, distinctly separated precipitate of yel
pus-corpuscles. The upper portion was not ropy, but poured
freely, was faintly acid, and a copious precipitate of albun

was obtained by heat and nitric acid. Examined by the microscope the lower part was composed entirely of pus-corpuscles, with granular walls, and with addition of acetic acid the nuclei became distinctly visible. Some granular matter observed in another sample was readily dissolved by dilute hydrochloric acid. The supernatant portion before the glass exhibited large spheroidal epithelial cells, with many scattered pus-corpuscles. (Plate X, figs. 8, 9.)

The opinion expressed after these facts had been elicited was that the patient was suffering from pyelitis of the right kidney, due in all probability to the impaction of a calculus in the ureter, or its lodgment in the head of that outlet from the pelvis; that the right kidney was enlarged and sacculated from this cause; and that the irritation of this concretion had set up inflammation of the mucous membrane lining the pelvis and extending probably to the calyces; and that the products of this inflammation (only partially retained by the body lodged in the head of the ureter, for the irregular shape of these concretions does not completely close the canal), on the one hand, passed as it were, *stillatim*, into the bladder; while, on the other, it was continually exercising a dilating or expanding pressure from within outwards, causing the kidney to become distended, and ultimately sacculated, with the entire loss of its tubular structure.

The uva ursi was first administered, with a grain of morphia, night and morning; but, in a few days, the morphia appearing to fail in its anodyne effects, Battley's solution was substituted, and for a short time with apparent relief; for on the 29th of May, the ward-book stated that the pain was neither so urgent or distressing, nor the desire to pass urine so frequent. The quantity passed each time, however, did not exceed two ounces; and the whole quantity during the twenty-four hours at this time amounted to not more than sixteen ounces. The characters of the urine continued the same; presenting a dense, well-defined purulent deposit, and a supernatant, now perfectly clear portion, faintly acid and albuminous. Emaciation continued; there were profuse perspirations; much thirst; and the tongue becoming brown and dry; pulse very small a weak.

On the 2nd of June he took quinine and sulphuric acid, t anodyne being continued; the former of these remedies seem to check the perspiration.

On the 12th of June there was some apparent improvement i the general condition of the patient. The thirst was less, t perspiration diminished, and the tongue, although red, w moist, and the patient had slept better. The urine passe in the latter part of the day emitted a very offensive odou and was for the first time alkaline and contained a muc larger proportion of purulent deposit; the upper portion wa however, clear and not ropy, and abundantly albuminou There followed so much exhaustion on the next day that he wa placed on ten ounces of port wine. Micturition became mor difficult than at any previous period of the disease. The opiu continued to procure slight mitigation of the symptoms.

On the 14th, there was much exhaustion, pallor of th countenance, and the urine passed involuntarily from him; th quantity could not be estimated, nor the character ascertaine On the evening of this day, the nurse reported that he wa suffering from loose watery diarrhœa.

On the 16th, the ward-book states that although much mor exhausted, yet the patient felt easier, and that the pain alway referred to the neck of the bladder and perinæum had subside An opinion was expressed that in all probability some communication had become established between the enlarged and sacculated kidney and the intestines, by which the contents of th renal organ had been discharged, and relief for a time obtained The condition of the patient was such that no examination c the loins and abdomen could be efficiently made. He lingere for two more days. The watery discharge from the bowels continued, and a turbid fluid escaped now and then in small quantities from the urinary passage. He died on the 18th of June.

*Post-mortem examination, eighteen hours after death.*—Th body was much emaciated. On opening the chest, the lung only partially collapsed; a few scattered bands of old organize lymph united the pleuræ in both cavities. Both lungs were the seat of tubercular deposit in the form of small gray granules, not exceeding a pin's head in size, nowhere in a stage of softening, nor were they in any spot aggregated together, but were diffuse, distinct, and surrounded by elastic permeable lung substance; the bronchial mucous membrane was natural in appearance throughout. The heart was soft and flaccid, with two white opalescent patches on its surface; the interior of the cavities and the valves were free from any morbid appearance. The peritoneum lining the cavity of the abdomen, and the peritoneal surface of the intestines, presented no inflammatory appearance, except in one spot, where a fold of small intestine, lying in contact with the fundus of the bladder, was covered with some recently-effused lymph, and surrounded by a margin of injected vessels. The colon was traced from the cæcum, and on raising it the right kidney was observed much enlarged, of a somewhat quadrangular shape, apparently sacculated, and fluctuating distinctly to the touch, from contained fluid. The large intestine was traced to the rectum, but no morbid condition was noticed; but the rectum, at a spot corresponding to the posterior and inferior third of the bladder, and a little to the left of the median line, was firmly united to it, and a fistulous communication at this point had become established between the bladder and the intestine, and by this channel the contents of the bladder had, since the commencement of the fluid dejections, been voided by the rectum. The mucous membrane of the bladder was of a dark slate colour, the upper half presenting the usual corrugations, but below the fistulous opening and surrounding it were numerous granular deposits, presenting the character of tubercle; the prostate was also the seat of a granular deposit. The effused lymph thrown out on one fold of the small intestines lying in proximity to the bladder was not more than a finger's breadth in extent, and had been developed by contiguity to the fistulous opening between the bladder and rectum. Within the bladder, the edges of the fistulous passage had a ragged and gangrenous appearance, and immediately beneath, and filling the portion of the bladder inferior to the fistula, was a mass of fibrinous matter, gelatinous in character and adherent, though not firmly, to the mucous membrane; there was much amorphous and gritty matter diffused through it, and in the most inferior part fragments of earthy, gritty matter, composed of triple phosphate and urate of ammonia. The two kidneys differed very materially from each other. The right was much enlarged; it distinctly fluctuated; and was as if sacculated. The left, though somewhat larger than natural, preserved its form, and presented no evidence of disease. The capsule of the right kidney was firm and dense, and was with some difficulty dissected from the cortical surface. When this was accomplished, the surface was found studded with white tubercular spots, each surrounded by a faint-red areola. On a section being made, a considerable quantity, about ten ounces, of a purulent fluid, of a yellow colour and creamy consistence, escaped, and displayed the interior of the kidney as a large sac, each of the calyces representing a small cup-shaped cavity, constituting the walls of the dilated kidney. These smaller cavities, as well as the pelvis of the kidney, were covered with a rough ragged fibrinous deposit. The ureter was much thickened, and throughout its extent was cord-like, its canal much narrowed, and its lining membrane of a slaty colour. There was not complete occlusion of its passage, for a small probe could be passed into the pelvis of the kidney, and, before the sac was laid open, the purulent fluid from the interior could be expressed from it. All trace of the tubular portion of the kidney had disappeared. The cortical part, when examined under the microscope, exhibited only a fibrous material with diffused granular and fatty matter. The urethra presented no evidence of disease. The mesenteric glands were enlarged, and were the seat of tubercle. The liver was natural in size and weight, but somewhat soft and greasy, and the hepatic cells were more loaded with fat than in health. A few scattered tubercles were present in the spleen.

The significant symptoms at the period this case first came under observation, may be conveniently placed in three groups—

I. The sensations of the patient in reference to the function of micturition, its frequency, and the subsidence of the pain after voiding the urine.
II. The proofs obtained by examination of the bladder and urinary passages that there was neither stricture, calculus in the bladder, nor prostatic disease.
III. The microscopic and chemical examination of the urine, and the physical examination of the regions of the kidneys.

I. Frequency of micturition, arising from or associated with pain at the neck of the bladder, or perinæum, or extremity of the glans penis, is a condition common to many disorders of the urinary organs, and is present in a greater or less degree in stricture of the urethra, calculus in the bladder, disease of the prostate, general irritability of the bladder, and in some special forms of disease of the kidney. A surgical examination of the canal of the urethra, or an exploration of the bladder, may be necessary to determine the presence of one or other of the three first-named conditions. But the symptom of most practical importance in connection with this part of the subject is the relation which the pain and uneasiness experienced by the patient bear to the function of micturition, or the act of emptying the bladder. While painful and frequent micturition are common to all the above-named disorders, yet the period during which the greatest aggravation or the greatest relief occurs, materially differs in each. Thus, in stricture the pain and distress are greatest during the effort, or during the act of voiding the urine. In stone in the bladder the pain is greatest after micturition, or when the bladder is empty. In disease of the prostate, the pain is continuous, and not relieved by micturition. While in those cases of pyelitis, particularly calculous pyelitis, in which irritability of the bladder exists—for it is not present in all cases—the pain, distress, and uneasiness are quickly and immediately relieved by micturition, however small the quantity passed; and in this respect these cases exhibit conditions and symptoms analogous to what is observed in ordinary irritability of the bladder and urinary organs, where pain and frequency of micturition are present; but the morbid conditions are readily distinguishable by a microscopic and chemical examination of the urine. In the case under consideration, these symptoms were very expressive; the patient spoke distinctly of the pain and distress acquiring intensity as the urine accumulated, though only to the extent of an ounce or two; that he experienced no difficulty in passing urine, and that the relief after micturition was complete. At the time he first came under notice this period of relief extended to an hour or two; latterly, the interval of ease became more and more limited, and towards the last, although the patient made no special complaint, yet it can hardly be doubted that the suffering was continuous, and allayed only by the anodyne influence of opium. This aggravation of the symptoms must be attributed to the tubercular deposit in the prostate and the bladder.

II. Before the patient left the surgeon's ward he had been carefully examined by Mr. Holt, Mr. Charles Guthrie, and Mr. Brooke, who were unanimous in their opinion that there was neither stricture, calculus, nor prostatic disease.

III. *The state of the Urine.*—The urine at the earliest period at which it was submitted to me for examination, was faintly albuminous, and contained numerous shreds, or fibrinous flocculi, some of which contained a minute clot of blood, visible to the naked eye; latterly, some of these fibrinous coagula contained gritty matter. This flocculent deposit presented, under the microscope, the characters of coagulated fibrine, stained with colouring matter (Pl. X, fig. 8); there were also scattered pus-corpucles, and numerous large-sized spheroïdal epithelial cells, some of which, by apposition, presented a polygonal aspect, having the usual character of epithelium from the pelvis of the kidney. The urine soon after became milky, and deposited a precipitate of pus-corpuscles; the upper portion of the urine remaining clear and natural in colour, but highly albuminous. The pain on deep pressure being made in the right lumbar region, and the greater fulness and obscure fluctuation of this part, completed the evidence in favour of the diagnosis that was formed. The presence of tubercle was not suspected; and it may be interesting at this point to inquire whether there are any and what means of distinguishing tubercle of the kidney during life? and another question also may be raised here, although perhaps it may not be capable of easy solution—viz., what relation did the tubercular deposit in the kidney bear to the earthy phosphatic concretion found in the pelvis of the kidney, and partially obstructing the ureter?

Let us examine these two questions separately. Are there any and what means of determining the presence of tubercle in the kidney during life? This question, I fear, at present must be answered in the negative. Rayer says: "Je ne connais aucun caractère dans la sécrétion urinaire, ni aucun autre moyen, à l'aide duquel on puisse diagnostiquer le depôt de la matière tuberculeuse dans les substances renales." He mentions circumstances under which it may be less difficult to determine the presence of tubercle; but supposing the tubercular deposit not to extend beyond the kidney, and not to affect the bladder or urinary passages, there is not any condition of the urine, nor other symptoms, by which tubercle of these organs can be correctly determined. It has been thought that the presence of an amorphous granular matter in the urine, insoluble in dilute hydrochloric or acetic acids, accompanying the pus-cells, may be accepted as a distinguishing feature of a tuberculous kidney in a state of ulceration. But this is a point of some difficulty to determine. In this case there was at times much amorphous granular matter seen under the microscope, accompanying the pus-corpuscles, but this was easily dissolved in either of the above-named acids; and as it was found associated with the gritty matter imbeddedin the fibrinous coagula, it was at once recognised as amorphous earthy phosphate. Where the opposite kidney is not diseased, urate of ammonia is oftentimes present, and would not dissolve in these acids, and might, to a superficial observer, be mistaken for organic amorphous matter: it would be readily removed by distilled water at a temperature of 90°. But these do not constitute all the difficulties in the way of correctly estimating this amorphous granular matter. Whatever causes the disintegration of any of the pus-cells would diffuse over the field an amorphous matter which would possess all the requisite chemical qualities of insolubility in acids, and yet it would not be necessarily characteristics of tubercle. I conclude, then, that in the present state of our knowledge, there is no condition of the urine which can be accepted as a diagnostic sign of tubercular ulceration of the kidney.

The second question—What relation did the tubercular deposit in the kidney bear to the earthy phosphatic concretion found in the pelvis of the kidney, and partially obstructing the ureter?—is one involving a conjecture as to the priority of either of these conditions: Did the earthy concretion first impede the function of the organ, and did the consecutive pyelitis induce the deposit of tubercle in the kidney? or was the tubercular disease, by embarrassing the excretory function of the kidney, the cause of such changes in the urine, before it could find its way to the bladder, that the formation of the earthy phosphates, in the pelvis of the kidney, was the result? Guided by the earlier symptoms of the case, the inference must be that calculous pyelitis existed before tubercular ulceration was established; but whether before tubercle was deposited cannot be determined. The symptoms of calculous pyelitis were sufficiently marked, even before any notable amount of pus appeared in the urine. Lumbar pain, difficult, painful, and scanty micturition, minute blood-clots with membranous flocculi in the urine, resolved by the microscope into fibrinous shreds, blood-corpuscles, epithelial cells from the pelvis of the kidney, and minute crystals of phosphatic concretions, forcibly indicated this disease; and it was not till some weeks afterwards that the large and abundant deposit of pus in the urine indicated that a process of ulceration was established. The post-mortem examination proved that this was connected with the tubercular deposit. The primary source of irritation, then, would appear to have been the calculous concretion which partially obstructed the mouth of the ureter. Under ordinary circumstances, with the other kidney unaffected, this condition might have continued for years. I have had one case of the kind under observation for the last nine years; and I have a preparation of a sacculated kidney with the calculus impacted in the head of the ureter, the duration of the symptoms during life being spread over an interval of nearly seventeen years; so that the rapid and fatal issue of this case must be attributed to the process of ulceration set up in the substance of the kidney, occurring in an individual in whom there existed, as the result proved, an overwhelming tubercular diathesis. This tubercular dyscrasia was forcibly exemplified by the wide sphere over which this product was deposited, existing in a crude state in the lungs, spleen, mesenteric glands, and prostate, and in an active state of ulceration in the kidney and bladder.

Rayer ('Traité des Maladies des Reins,' vol. iii, p. 643 et seq.) has recorded several cases of tubercular deposit in the bladder accompanying tubercle of the kidney; but the peculiar feature of this present case consists, not so much in the presence of tubercle in the bladder, or its wide diffusion in other organs of the body, as in the tubercular ulceration in the bladder, and the fistulous communication which was established between the bladder and the intestine. Cases in which fistulous communication has taken place between sacculated kidneys with obstructed ureters and the large or small intestines, although rare, are not without example. Rayer mentions several. Two such cases have occurred under my own observation. In one remarkable case, a large encysted and sacculated right kidney opened a passage for its contents into the contiguous ascending colon, and a temporary cure was effected by what was supposed to be a violent diarrhœa. But I am unacquainted with any analogous case of a fistulous opening between the bladder and rectum caused by a tubercular ulceration in the mucous membrane of the former.

Upon a careful consideration of the contents and condition of the bladder, I think it will not be difficult, to a certain extent, to account for the amount of obstruction to the escape of the contents of the bladder through the urethra, which must have pre-existed, and operated as the direct cause of this fistulous ulceration. Up to the last week of his life, the patient never experienced any difficulty in passing urine; the frequency of micturition was not accompanied by any conditions that indicated obstruction or difficulty; and at the post-mortem examination, although tubercles were observed in the prostate yet these were granular and inactive, and the gland was no enlarged to an extent sufficient to form any impediment to th free passage of the contents of the bladder. Within six day of the patient's death, it was observed that he no longer passe his urine voluntarily, and it was reported in the ward-boo that what little was passed seemed to dribble away from th urethra; on the next day, the diarrhœa, as it was reported suddenly set in, and it was at once conjectured that a communication had somewhere been effected between the kidne and intestines; but the opening had taken place between th bladder and rectum, and not between an obstructed and sacculated kidney. So long as the urinary passages were free, suc ulcerative communications were little likely to be formed. Ther was no stricture of the urethra; there was no prostatic diseas sufficient to cause retention of the contents of the bladder How, then, did the bladder fill, and through what cause wer its contents forced to an outlet by the lower bowel? At th bottom of the bladder, adherent to the mucous surface, an filling the space between the ureter of the right side and th opening of the urethra, was found a gelatinous coagulum, o a jelly-like consistence and colour, and in the lower part o which some earthy, gritty matter was found. This gelatinou exudation constituted, I believe, the proximate cause of th obstruction to the escape of the contents of the bladder, an the consequent retention led to the fistulous communicatio with the rectum. I think this opinion is corroborated by th observations of Sir Benjamin Brodie. In his work on 'Diseases of the Urinary Organs' (p. 134), he mentions a case in which a mass of lymph, of the consistence and appearance of jelly, was found in the urine. The patient suffered from frequent micturition, and had a deposit of pus in his urine, and on the occasion when this gelatinous matter passed, he suffered from symptoms which were thought to indicate the passage of a renal calculus. The pain suddenly ceased with the escape of this jelly-like fibrine, but the patient subsequently died, and

Sir Benjamin Brodie concluded that the immediate cause of this patient's death had been retention of one of these fibrinous masses.

Nothing can be more calculated effectually to obstruct the escape of urine by the natural passage than one of these gelatinous masses filling the lower part of the bladder. Tubercle, already deposited in the tissues of the bladder, offered a condition in which the ulcerative process might most readily commence, and a fistulous opening be quickly established. An exudation of plastic lymph on the surface of the bladder, as well as on the intestine surrounding the ulceration, effectually preserved the peritoneal cavity from any infiltration of the contents of the bladder.

In these cases we cannot permit ourselves to hope that the result of treatment can be other than palliative. When the suppurative process in the kidney arises from tubercular ulceration, its exhausting effects rapidly reduce the vital powers, and neither nutritive substances, cod-liver oil, nor other medicinal agents, can be expected to arrest the fatal process. Of the remedial means most productive of benefit, opium in the form of Battley's solution, or the preparations of morphia, yield the most satisfactory results.

The microscopic appearance of the urine has been figured on two occasions, with the object of showing that in tubercular pyelitis the purulent urine does not differ from, nor present any characteristics at variance with what is constantly observed in calculous pyelitis. There were, perhaps, more free nuclei, and diffuse granular matter in the field than in ordinary cases of purulent urine; but these characters were not sufficiently pronounced to justify by their presence the diagnosis of tubercle in the kidney.

## TUBERCULAR NEPHRITIS.

### *Tubercular pyelitis of Rayer.—Tubercle of the kidney.*

I have already alluded to the difficulty of the diagnosis of tubercular nephritis. I have on a former occasion shown that the urine in these cases is simply purulent, and that in th sediment there seems nothing which can be accepted as pathognomic of tubercle, nor is there any symptom or group o symptoms during life, which can with any degree of certaint be accepted as diagnostic of this form of renal disease; althoug attention to the progress of the symptoms, and the undiminished amount of pus in the urine may remove some of th difficulty.

The symptoms are plainly derived from the kidney. Ther is frequency of micturition, a scanty amount of urine voide each time. There is urgent pain, referred to the hypogastri region, increasing in intensity till micturition is performed, an then disappearing, and gradually acquiring force till th painful sense is again relieved by passing a small quantity o urine. There are other sympathetic conditions; a sense o pain and aching in the crest of the ilium, or numbness in th direction of the external crural cutaneous nerve. There i lumbar pain, and there may be lumbar fulness, even a tumour detected.

The urine is opaque and milky when passed; and at res soon separates into an upper more or less clear portion, and well-defined precipitate of a whitish or yellowish white deposi of corpuscles. The upper clear portion is albuminous, and drop examined by the microscope will usually exhibit a few isolated pus-cells that remain suspended. The sediment, more or less abundant, according to the extent of disease, consists entirely of pus-corpuscles; if liquor potassæ be added, the sediment is rendered viscid and ropy. If the urine has been recently passed, no crystalline objects are seen, but in the course of a very few hours, particularly if the proportion of the liquor puris be sufficient to render the urine passed neutral, or faintly alkaline, then crystals of the triple phosphate may be present. All these conditions, both the subjective and objective, may be present in equal force in calculous nephritis, as well as in tubercular nephritis.

There is, however, one distinctive and well-marked feature which characterises tubercle of the kidney, and that is its rapid and fatal progress. From the commencement of the liquefaction of the tubercular deposit, and the consequent ulcerative process, there is no mitigation of symptoms, no amelioration of suffering, no diminution in the purulent sediment in the urine; there is rather a daily increase. Emaciation proceeds, exhaustion rapidly follows, and within a few months of the first manifestation of the renal disorder, the patient sinks and dies. This is not the character of calculous disease of the kidney; there are marked intermissions of suffering, paroxysms of pain followed by intervals of comparative quiet. The quality of the urine varies much; the portion passed at one period of the day may differ from that passed at another. It may contain little or no pus one day, and the next its presence is unequivocal. Hæmaturia is of frequent occurrence, not abundantly, but in small quantity. The patient may, and often does, retain a certain amount of flesh and strength, and may even be able to engage in some of the lighter duties of life. The calculus may ultimately become encysted, and removed from the power of further mischief, or it may descend into the bladder. Such cases extend over a period of years, and are not incompatible with an average duration of life. How different in these respects, then, is calculous from tubercular nephritis.

If a patient, then, has purulent urine associated with the symptoms already described; if the sufferings of that patient are continuous and uninterrupted but by opiates; if the urine daily exhibits the same undeviating purulency; if the urine of each micturition preserves the same character; if there be a progressive and unchecked emaciation, and rapid advance to fatal exhaustion, I should, upon the sum of these symptoms, conjecture that the disease was tubercle, and not calculus, of the kidney. The diagnosis, it is admitted, would rest on a slender basis, but these are in my experience the chief, and, I believe, only distinctive features between tubercular and calculous nephritis.

Let us see how they are exemplified in the following case.

Case XLVII.—Hannah W—, æt. 27, single, in service, was admitted February 29th, 1858.

In the countenance of this patient there was som
singularly and forcibly expressive of suffering, and her
suggested at once some deep-seated disorder. Her tongu
much coated, and it frequently became dry; there was
thirst; the skin was harsh and dry; her appetite was defi
her bowels not disordered; the pulse was of moderate str
and average frequency. Her sleep was very restless, bein
turbed by the frequency of micturition, being unable to
her water for more than half an hour at a time. The
passed was of a milky, opaque appearance. She suffered
much pain across the loins. She stated that she had be
for about five months, that she had previously enjoyed tole
good health. She attributed her illness to sitting last au
on the wet grass, soon after which she began to notic
frequency with which she required to make water, and
scalding kind of pain which accompanied the act. She
not call to mind that she had ever noticed blood in the
From her attention first being drawn to its appearan
presented the same character as at the present time.
stated that the pain she suffers is constant, and nothin
relieved it.

It seemed to come from her back, and to extend t
crest of the ilium, more particularly on the left side; th
would reach in the direction of the neck of the bladder,
cause so much aching and distress that she could atten
nothing. Some temporary relief would follow micturi
only to return again with the same intensity half an
afterwards. These symptoms have continued to increas
the last three months. She had applied to various me
men, but without relief. Some suspected diabetes; some s
in the bladder; she had been sounded, and nothing foun
the bladder.

An examination of the lumbar region failed to detect
increased fulness on either side, but deep-seated pressure-
grasping the flank with the hand, and making pressure with
thumb—caused much increase of pain, and a sense of s
bing in the direction of the pubis. There was no numbnes

any altered sensibility in the external cutaneous nerves of the thigh, on either side. The chest was examined, and the function of respiration was healthy. The stomach had never been disordered; she had never had any attack of vomiting or nausea. On the day after her admission, the urine passed the previous twenty-four hours measured about two pints. She had not during that interval passed more than an ounce each time, and she had passed water more than twenty times.

The urine, set at rest in a tall glass, separated into two portions, an upper clear orange-coloured urine, and a well-marked sediment of pus-corpuscles. The upper part was faintly acid, and was albuminous by heat. The lower part, on the addition of liquor potassæ, became converted into a viscid, ropy fluid, and examined by the microscope, displayed nothing but pus-corpuscles. No crystalline forms were visible. A good deal of free granular matter was dispersed over the field, which was unaffected by dilute acetic or hydrochloric acids.

There could be no doubt that the pus was derived from the kidneys. The whole category of symptoms unequivocably fixed the diagnosis as purulent nephritis. There was no symptom in her case to justify the suspicion of calculus of the bladder. Purulent urine does not necessarily imply calculus; and those surgeons who examined her for stone could have attended but little to the character of the urine, or the other well-marked symptoms of her case. From such symptoms I had no hesitation in pronouncing the case to be one of purulent nephritis. The kidneys were the seat of ulceration, and an abundant supply of pus was derived therefrom. But what was the cause? There are not many diseases of the kidney in which so large a secretion of pus occurs. In calculous pyelitis the amount is sometimes large. In tubercular pyelitis it is even greater. In cancer of the kidney the urine rarely becomes purulent. The age of the patient, the history and progress of the case, and the absence of the cancerous cachexia, excluded the idea of cancer of the kidney. The disease then should be either calculous pyelitis, or tubercular disease of the kidney.

The patient had never suffered from any of those early sym
toms which usually determine calculous disease. But her a
count of herself was necessarily imperfect; and little relianc
perhaps, should be placed on answers given to leading questio
by patients of this class of life. They have no desire to mi
lead; but in the majority of cases they have not attended
the points which the physician is most desirous of knowin
At this juncture I inclined to the belief that the case was o
of calculous irritation—and it was not till some days after th
from the rapid exhaustion and increased amount of pus in t
urine, that I leaned to the fear that it was tubercular diseas
The principal of treatment is the same in both; it is to allay-
for all we can do is to mitigate—the sufferings of the patien
and diminish by opiates the distressing frequency of micturiti
and general irritability of the urinary apparatus. She w
ordered the Liquor Opii sedativus, in small doses, to be fr
quently repeated, and it was given in the decoction of U
ursi. But this failing to lessen the pain and distress, larg
doses at longer intervals were found more advantageous.

On March 5th she was evidently relieved by the influence
the narcotic, and she expressed herself as having felt more ea
and had been able to sleep longer than for many weeks. T
urine, however, continued highly purulent; and notwithstan
ing the apparent relief the patient experienced, it was clear th
her powers were yielding to the drain of such a large purule
secretory surface. No alteration took place in her sympton
and she died March 9th; symptoms of fatal exhaustion comi
on suddenly and unexpectedly.

It was with great difficulty that a post-mortem examinati
was obtained, and then only with a promise that the kidne
alone should be examined. Both kidneys had a boggy, sacc
lated feel; they were lobulated, and from the cut extremities
both ureters pus dropped freely. The left kidney, unopene
weighed seven and a half ounces—the right, four ounces and
half. On removing the capsule of the left kidney one or tw
small yellow deposits, about the size of a lentil seed, were se
imbedded in the capsular covering. The surface of both kidne

was smooth and somewhat pale, and had many similar yellow spots imbedded in the cortex. A few of these deposits, larger than the others, raised the surface slightly. On a section being made, both kidneys were found sacculated, and contained a quantity of pus. The ureters were not obstructed, but their diameters did not appear so large as ordinarily, from a general thickening of the wall of the tube. The left kidney was in a more advanced stage of disease than the right. In both, the quantity of tubercular deposit dispersed through the organ was very great. In those spots in which the ulcerative process had not commenced, the deposit had a yellowish white appearance, giving the parenchyma of the kidney the appearance of being studded with yellow granules. Some of the larger of them were surrounded by an inflammatory margin—and the softening and ulcerative process seemed to commence in the centre. In the left kidney there was one large cup-shaped ulcerative cavity, or renal vomica—its margin composed of a whitish structure, denser than the surrounding parenchyma. The pus-secreting surface of this, as well as of the smaller cavities, was tuberculated in a marked manner. The mucous membrane of the pelvis of both kidneys was remarkably scabrous, and had also numerous tuberculated elevations studded over it. These characters are seen in a drawing in my possession made while the preparation was perfectly fresh.

The yellow deposit in the capsule was of a cheesy consistence, and when examined with the microscope consisted entirely of fine molecular granules, and some larger fat-granules; not a trace of cell-structure was visible. The yellow tubercle in the cortex of the kidney had a similar appearance. The renal structure in the interval of these deposits exhibited the usual tubular arrangement of healthy kidneys, the epithelial cells, both in appearance and position, being quite natural. The softening tubercle, was to a certain extent, remarkable for the absence of the usual proportions of fat- and oil-granules; and, with the exception of large granule-cells (Gluge's) and pus-corpuscles, no special condition was observed. Each small deposit of tubercle was surrounded by a marked halo of redness.

In those in which the process of softening was in its commenc
ment, this inflammatory areola was most marked. Wh
microscopically examined, it appeared as a fine fibroid depos
something of the character of recently coagulated lymph,
interlacing of fibres in every direction. The progress of tube
cular ulceration in the kidney would thus appear to be subje
to the same law which has been observed in tubercular ulcer
tion of the lungs. The tubercular deposit, during the proce
of liquefaction, sets up a certain degree of local irritation;
exudation of lymph follows. While the tubercular dispositi
lasts, this becomes the seat of fresh tubercular deposit; this
its turn softens, extends the area of inflammatory exudatio
and thus expanding from within outwards, the ulcerating su
face enlarges, limited only by the boundaries of the organ, tl
life of the patient, or, in such rare cases in which the tubercul
ulceration is arrested, by the cessation of the disposition to tl
formation and deposit of fresh tubercle.

The progress of the symptoms in this poor girl's case was su
as might justify the diagnosis of tubercle. Her symptoms we
continuous and unmitigated. The urine always exhibited t
same purulent character; the urine of one micturition did n
differ from that of another. There was no hæmaturia; a
exhaustion and emaciation were rapid and fatal. These a
slender differences in the character of symptoms on which
rest a diagnosis, but I believe they are the only ones whi
exist between calculus and tubercle of the kidney, and wh
present in a marked manner, would justify a diagnosis of t
latter more formidable malady.

## RENAL ABSCESS—TUBERCULOUS PYELITIS.

The two following cases of renal abscess will, in contr
distinction to the last, illustrate some of the difficulties
a diagnosis between calculous and tubercular disease of tl
kidneys. The patients were both young women, and although

considerable drain of pus had been going on in both cases up to a very recent period, it was remarkable, though usually the case, that the aspect and general appearance of neither patient would suggest so severe a disease as abscess of the kidney.

Case XLVIII.—Emma S—, æt. 25, of short stature and dark complexion, but not unhealthy look, a servant by occupation, came under my notice last autumn in Hallett ward.

At that time she suffered more particularly from pain at the bottom of the pubis and meatus urinarius, as well as in the left hip, as if proceeding from the left kidney, with frequent and painful micturition. At that time blood occasionally appeared in the urine as small clots, or thready and membranous. The urine was at this time constantly purulent. She dated the commencement of her illness about eighteen months since, at which time she stated she could not hold her water. She described also at an early period a sudden, sharp, lancinating pain, arising in the left lumbar region, and followed by this difficulty of retaining the water, with distressing frequency of micturition. It was not for some months that the urine became distinctly milky and thick. She appeared to have undergone some examination on the suspicion of stone in the bladder. But she never had the symptoms characteristic of that form of disease. She was admitted into Queen Adelaide Ward, January 4th, 1861. Her most characteristic symptoms at this period were; severe paroxysms of pain of a stabbing and pungent character, commencing in the region of the left kidney and darting downward apparently in the course of the left ureter, and fixing itself in the symphysis pubis, mitigated only by the passage of a small quantity of urine. These paroxysms of pain, and urgency to micturate, continued night and day, the quantity of urine passed at each time not exceeding a spoonful, sometimes not so much. The whole quantity in the twenty-four hours did not appear disproportioned to the amount of fluid drank. The urine collected and set aside separated into a very pale clear portion and a dense, well-marked sediment of pus-corpuscles. On examining the abdominal region, the left lumbar space and the flank of that side appeared fuller, and a doubtful sense of fluid was felt. Pressure made on this limited spot excited a sickeni sense of pain, of the same character as that described as comi on in paroxysms. The patient stated that she had seen wh she thought red sand in her water some years since.

She did not appear to have experienced any aggravation pain on any bodily exertion, such as walking over uneven groun or the jar of a vehicle, or going down stairs, occasions whi will frequently excite increased suffering in cases of renal ca culus. When the sediment was examined by the microsco pus-cells were the chief objects, a few oval epithelial cells, pr bably from the ureter, were once seen. The treatment w based on the anodyne effects of opium and benzoic acid. Te grains of benzoic acid, and a drachm of the compound tincture camphor, was taken every four hours. She was placed on liberal diet, and the constipating effects of the opiate counte acted by castor-oil. In the course of three weeks from admissio the purulent sediment in the urine gradually decreased. Mi turition was less frequent and the paroxysms of pain appeare to have yielded to the soothing influence of the paregoric.

I thought at this time, that though in all probability muc relief had been obtained by the agency of opium, and the di tressing frequency of micturition had been moderated by it, y that the gradual decrease of the pus could not be attributed this remedial agency, but that it was rather the natural progre of the disorder; and I hazarded a conjecture that as the absen of pus from the urine became more complete, the patient woul probably suffer a fresh series of symptoms, of which the presen of a renal tumour would form the key. And it was found th now a distinct fluctuation could be detected in the lumba space. The patient also suffered much from a constant achin wearing pain in the loins and on the left hip bone. I though that this diminution of the pus and increase of the renal tumou arose from the probable increase in the size of the calculus that it now for a time blocked up the infundibulum of the kidney in which it was probably lodged, but that soon the pressure o the accumulating pus would dilate the infundibulum and allo the pus once more to escape. This circumstance occurred agai and again during the last four months. The urine continued pale and clear without any purulent sediment for a few days, the patient always suffering much at these periods; relief came with the reappearance of the pus. To copy the daily record of the case-book would be tedious and uninstructive, for it contains accounts of the alternations of these periods of aggravation and relief. During three months she did not deviate from the treatment at first adopted, opium and benzoic acid, and a good diet. Uva ursi was for a short time given; but the patient declaring that nothing had ever done her so much good as the opiate, the former was not repeated. In the beginning of May, the record states that the patient remained without any marked alteration of symptoms. On the whole, she suffered less pain than formerly. Her chief symptoms continued to be paroxysms of pain; something analogous to renal colic, commencing at the left hip, extending to the groin, and thence to the meatus urinarius, and temporarily relieved by passing a small quantity of water. These paroxysms were now only present when the urine was free from sediment, and became relieved immediately the flow of pus was re-established. Her general condition continued remarkably good. On June 6th, the urine exhibited but traces of pus for a period of three weeks; a longer interval than she has ever before experienced since the urine became purulent. And this subsidence was characterised by the absence of any of those paroxysms of pain she formerly suffered when the urine remained clear.

There was no appreciable enlargement of the left lumbar space to be felt, and pressure did not produce any marked increase of pain.

I had occasion to remark that during these intervals of apparent improvement, the urine, though to the unaided eye free from pus, was nevertheless very pale, and as if a drop or two of milk had been added, and though a very scanty sediment was thrown down, that this invariably exhibited abundance of pus-cells: now in calculous pyelitis, during those intervals in which the purulent discharge is obstructed by the impacted calculus, the urine secreted by the other kidney, presuming it to be healthy, presents the usual characteristics of ordinary urine. This circur stance threw considerable doubt upon my first opinion that tl was a case of calculous pyelitis. Nevertheless, the tempora improvement and the positive diminution, though not enti absence of pus, was not in accordance with what usually happe in tuberculous disease of the kidney. Her condition was suf ciently improved to justify her leaving the hospital.

No long time however elapsed before she was again admitte On the 2nd of August she came to the hospital in a state great exhaustion, suffering from diarrhœa and scanty, almo suppressed urine. The countenance was anxious, the pul very small and weak, the tongue red and inclined to be dry, bu there was no drowsiness, but great thirst. The renal tumou formerly mentioned, could not be felt, and after a careful co sideration of her condition and symptoms, it appeared to m that the diarrhœa in all probability was caused by a communica tion between the renal tumour and the intestine (a terminatio before alluded to), and that notwithstanding the unfavorabl aspect of the symptoms, the patient might yet struggle througl Stimulants and nutrition were abundantly supplied, but wit varying results; for a day or two an improvement took plac and some very pale but scanty urine was collected, which gave small sediment consisting of pus-cells. On the 23rd of Augus the report stated that no urine had been passed since th 21st. A catheter was passed, but no urine was in the bladder the diarrhœa continued, it was a watery, pituitous, yellow coloured fluid, in which no pus was discernible. She died tw days afterwards.

I certainly expected to find a fistulous communicatio between the kidneys and the intestine, but none such existed Both kidneys were sacculated; the left, the largest, contained creamy fluid, which with difficulty could be squeezed througl the channel of the thickened and narrowed ureter. The kid ney on being opened presented all the characters of the most ad vanced tubercular pyelitis. The ulcerative process had scoope out a number of cavities, lined with a spurious pus-secretin membrane. The right kidney presented similar appearances only less advanced. The cortical layer was thickened, and some trace of the cones was found, as well as of the tubular structure of the organ. The cup-shaped cavities were as in the left kidney, lined by a pus-secreting membrane. The ureter was permeable, but its canal narrowed and its walls thickened. The lungs had a few scattered tubercles in the apices. The liver was fatty and pale. The mesenteric glands were much enlarged, and soft, and evidently the seat of tubercular deposit. This case, although in its progress more tardy than is usual with tubercular disease of the kidney, nevertheless afforded an example of the reliance which may be placed on the persistence of a purulent urine as a sign of the tubercular disease.

The urine in this case presented the rare character of intermissions in the amount of pus. Some days so small a quantity was present as to give to the urine merely the appearance of a drop or two of milk having been added to it. I am free to admit that more than once I was deceived by this diminution into the belief that its subsidence was due to the impaction of a calculus in the ureter, particularly as this conclusion was strengthened by the presence of a renal tumour, which became painful in proportion as the quantity of pus in the urine decreased. But pus never altogether disappeared. The urine never presented any of the characters of a secretion formed by a second kidney unaffected by disease. Pus was always present; the urine always had the appearance of milkiness, however faint. And this case strengthens my conviction, that a urine which never altogether loses its purulent character, though the pus decreases to an infinitely small quantity, the faint, milky aspect continuing throughout, becomes a very reliable diagnostic sign of tubercular disease of the kidney.

### RENAL ABSCESS; TUBERCULAR?

The next case is also that of a young woman; but, excepting that the urine was abundantly purulent, and that there was frequent and painful micturition, the symptoms present

no other feature in unison. It was an abscess of the kid
—probably of both kidneys—but it had exhibited some of
characters of tubercular or scrofulous pyelitis, rather t
the calculous form of the disease. This case will afford
an opportunity of making some observations on the diagn
between these disorders.

CASE XLIX.—Elizabeth D—, æt. 21, a servant, of g
stature, well proportioned, and not unhealthy aspect, was
mitted April 5, 1861, into Queen Adelaide ward, with
following history. About three months since she experien
a severe pain in the left groin, aggravated by motion,
accompanied by violent lancinating sensations in the mea
urinarius, with distressing frequency of micturition. She sta
that the quantity of water passed was very small each ti
that it was milky from the first, and that no relief was
perienced by emptying the bladder, however frequent. She h
no recollection of having seen blood in the urine at any ti
The urine had been from the first of the same milky appearan
and at no period had it deviated from this character. Th
appeared, from her description, to have been a feverish state, w
anorexia and thirst, and constipated bowels at the commen
ment of her illness; she did not appear to have received
medical treatment at this time. But the frequency of passi
water, the unnatural appearance of it, and the pain in the l
and pubis, caused her to seek relief. My attention was call
to her case by my friend Mr. Power, and I had no hesitati
in pronouncing it a case of renal abscess. The urine w
examined the day after her admission. The supernatant cle
portion had the colour of healthy urine; it was faintly acid;
was albuminous, and it had a specific gravity of 1·015. T
sediment was of a pale, yellowish, or creamy hue; it occupi
more than one-half of the glass in which it was allowed to fa
Both by the microscope, and by liquor potassæ, it exhibited t
characters of pus. All the organs appeared healthy. Th
sounds of the chest were natural, also those of the heart. Th
pulse was natural in volume and frequency. The tongue w
clean, and the appetite moderate; no thirst. Slight tenden

to constipation. Sleep disturbed by frequency of micturition. She was ordered the potassio-tartrate of soda, as a laxative; and the cod-liver oil in drachm-doses three times a day; full diet, and a pint of porter. The symptoms here recorded are not those strictly pathognomonic of calculous disease of the kidney.

1. Calculous disease is most frequently associated with hæmaturia in the early stage.

2. It commences without any well marked origin.

3. The urine becomes gradually purulent, oftentimes weeks elapsing before the full measure of pus is discharged.

4. The symptomatic pains are usually characteristic—pain before, not after, and relieved by, micturition; pain more or less situated in the haunch bone, and extending down the thigh, occasionally with numbness, and in the male, retraction of the testicle.

In the case under consideration there appears to have been a period of febrile disturbance marking the origin, or early period, of the attack. There was no hæmaturia, and the urine became quickly, suddenly, milky or purulent. I am quite aware of the difficulty and uncertainty in getting a correct history of symptoms three or four months past; and more particularly where a patient was not under medical treatment. Yet this young woman was by no means deficient in intelligence, and she spoke most distinctly of the febrile symptoms, the prostration and exhaustion, the loss of appetite and thirst which ushered in the complaint. I cannot doubt her correctness. These were not the symptoms of calculous disease of the kidney. They were more the signs of nephritis. Now I am by no means prepared to admit the existence of a disease which was once called idiopathic nephritis.

Inflammation of the kidney never exists but as a symptom. It is either symptomatic of Bright's disease, of calculus in the kidney, of tubercular or scrofulous deposit in the kidney, of some malignant disease, as cancer—all of which are accompanied by their appropriate and diagnostic characters. Bright's disease often commences with fever, but this is followed by special alteration in the quality and composition of the urine. Tubercular and scrofulous inflammation of the kidney comme with febrile disturbance, followed immediately by purul urine. Malignant disease occasionally commences with rig followed by violent and repeated hæmaturia. Calculous dise of the kidney rarely commences with fever; its sympto come on insidiously, most frequently with slight attacks hæmaturia, followed by turbid or mucous urine, ultimat becoming purulent.

Taking into our estimate the history and progress of case, it presents the features of tubercular or scrofulous p litis, rather than of any other form of renal disease. Th was a febrile stage; no hæmaturia; and a sudden appeara of pus in the urine, and that purulent state continued un terruptedly, not intermittingly, but continuously. But let state the progress of the case after a month under treatm by cod-liver oil. The frequency of micturition subsided, she felt getting better daily. She passed water not more th two or three times in the night; before, it was nearly ev quarter of an hour. The amount of sediment had sensi diminished; not occupying more than half the bulk it did admission. Again, in the beginning of June, two months af treatment, the case-book stated that the amount of pus continu to decrease. Micturition not more than once during the nig and the presence of pain in the passage, and at the pubis, was o occasional. In the middle of July the urine presented onl flocculent sediment. Now this is not the ordinary progress tubercular or scrofulous pyelitis. In that form of re disorder the patient rarely exhibits signs of improvement, does the disease become ameliorated. If the progress of su cases is not rapid, it is usually, I may almost say uniform towards a fatal termination. The structure of the kidney, filtrated throughout with tubercular deposit, breaks up at ma different points into a state of active ulceration, and the pur lent drain soon exhausts the patient, who dies within a f months of the commencement of the symptoms. In this ca every feature but one agreed with tubercle of the kidney; a that one of disagreement is the manifest improvement of t patient, not only as regards her general health, but as regards the local symptoms of the renal disorder.

In the sequel she experienced no unusual frequency of micturition; no pain; the urine exhibited a faint deposit of pus-cells, but the general health was excellent. It may be asked, may there not be an idiopathic nephritis, an uncomplicated inflammation of the parenchyma of the kidney terminating in suppuration, and may not this be an example? I have already expressed my doubts as to the existence of an idiopathic nephritis. The celebrated Dr. Gregory held this opinion. Moreover, nephritis whether from local injury, morbus Brightii, or calculus, mostly declares itself by an attack of hæmaturia. The patient had never suffered from such a symptom, and in this respect her case was analogous to one I have already given in detail.

The interesting feature of this case was the gradual diminution of the purulent deposit; its becoming at last little more than a flocculent sediment, such as is sometimes seen in urine surcharged with urethral, vaginal, and vesical epithelium. Here, at the latter stage, the urine presented the features usually noticed in the second stage of calculous disease of the kidney. The urine first sanguinolent and scanty, becomes clear with a mucous deposit, followed, often rapidly, by the presence of a large quantity of pus. In those cases of calculous disease of the kidney in which, the calculus by forming a pouch or bed for itself, the purulent discharge gradually ceases, the urine for a time presents just such conditions as are observed here. It is a subsiding of the irritation caused by the calculus, and a gradual change from the formation of pus-cells to the production, first of cells with many nuclei or granular, and ultimately to the development of cells which continuously approach nearer and nearer to the character of the ordinary epithelium of the part. The treatment of this case was purely palliative. Great benefit appeared to have been derived from cod-liver oil, which seemed to have supplied the waste which so copious a purulent discharge necessarily created. The case forcibly illustrates the difficulties of diagnosis between calculous and tubercular pyelitis.

The existence of such a disease as idiopathic nephritis h
been doubted. That is, of a disease which represents an infla
mation of the substance of the kidneys, followed by the fo
mation of a large quantity of pus, and not excited by the ir
tation of a calculus, or the presence of tubercular or scrofulo
matter. Cases occur, however, in which, while all the chara
teristic symptoms of tubercular or scrofulous pyelitis a
present, the sequel forbids us to think that these could be t
active agents; as it is contrary to experience to expect a cu
of such forms of renal diseases, and as such cases want t
characteristic symptoms of calculous pyelitis, they must eith
be examples of tubercle of the kidney curable, or of idiopath
nephritis, the existence of which has been doubted. The follo
ing case illustrates this doubt:

Jeannette G—, æt. 32, in service, was sent up from t
country for my opinion. She had twice suffered from hæm
turia preceded by rigors, soon followed by a most distressi
pain and aching at the neck of the bladder and urethra, w
urgent frequency of micturition. These symptoms commen
some twelve months before I saw her in March, 1865. T
urine she stated was milky when passed and settled into a cl
portion and a sediment. She had never passed sand or grav
When I first saw her she could retain but little water; mict
rition being required every half hour. She had lost flesh; t
appetite was capricious; her rest was broken. She suffer
night sweats, and her general aspect was anxious and ca
worn. She described a pain in the right lumbar region, whi
was increased by pressure and darted down in the direction
the ureter of that side. The urine was distinctly purulen
the sediment forming nearly one fourth of the fluid. The
was no cough and the chest was free from all intimation
tubercle. No renal tumour could be detected. The microsco
exhibited the field full of pus-cells, with here and there an ep
thelial cell from the bladder and urethra. I viewed the
symptoms as arising from scrofulous pyelitis or tubercle in t
kidney, and an unfavorable prognosis was formed.

It was eventually decided that she should come under r care in the hospital. She was received about the last week in March. Her symptoms on admission were those above described; the most prominent of which was the urgent calls to pass water every half hour, destroying all chance of refreshing sleep, and to allay which was the first object.

She had the compound tincture of camphor in drachm-doses every four hours. Cod-liver oil and eventually the tincture of the sesquichloride of iron. She continued with varying prospects of improvement, finding much benefit from opiates, till the commencement of June, when the purulent condition of the urine began to abate, and the desire to pass water with the pain at the neck of the bladder to subside. She began to make flesh, her sleep now becoming restorative, and but little disturbed by calls to pass water.

In the beginning of July she did not pass water more than every four hours, and the purulent deposit in the urine could only be recognised by the microscope. She eventually left the hospital for Scotland at the end of July in a comparatively good state of health.

These symptoms could scarcely arise from tubercle or from scrofulous pyelitis, as these disorders never terminate favorably, and they certainly had not the characteristics of calculous pyelitis. The origin of the complaint, twelve months before was obscure; for although the patient was intelligent enough, yet I failed to elicit any reliable facts from which I could trace the commencement to causes calculated to excite simple uncomplicated inflammation of the kidneys. If the case conveys no positive information as to the cause of the symptoms, we learn, however, how valuable and reliable an agent is opium to allay pain, and how much may be expected from cod-liver oil and nutrients, in conjunction with ferruginous preparations.

## SUMMARY OF SYMPTOMS DIAGNOSTIC OF SUPPURATIVE, TUBERCULAR OR SCROFULOUS NEPHRITIS.

Frequency of micturition, most distressing and urgent, sometimes every ten minutes or quarter of an hour. Aching pain at extremity of urethra or neck of bladder, momentarily r by making water. Hæmaturia more or less abundant, sponding with, or just antecedent to severe rigors. Hea pain in the loins. Heat of skin and accelerated puls evidence of febrile disturbance. Sometimes, irritability stomach. Urine rapidly becomes purulent, each mict presenting the urine as a milky fluid, which at rest soo rates into a purulent sediment and a supernatant clear, s albuminous fluid. Microscope exhibits nothing but p and granular matter. The amount of pus gradually and daily increases. The patient suffers exacerbations of f the form of hectic.

The symptoms of suppurative nephritis unconnecte tubercle will not materially differ, except that this i extremely rare and has not necessarily a fatal terminatic

## CHAPTER VII.

### ON THE DIAGNOSIS OF MALIGNANT AND CANCEROUS DISEASES OF THE KIDNEYS.

Cancerous or malignant disease of the kidney or bladder is among the least common of the disorders of these organs. It occurs for the most part in the middle or later periods of life. It is incurable, and may be said also to be irremediable, except through the soothing influence of opium; the cancerous growth cannot be arrested, and sooner or later the patient sinks from the exhaustion of frequently recurring hæmorrhage. In a few cases this form of disease brings with it the expressive and unmistakeable features of the cancerous diathesis; in others this peculiarity is absent, and the countenance of the patient exhibits but the characteristics of a hæmorrhagic and fatal disease. The disease, whether of the kidneys or bladder, is often not recognised even by physicians and surgeons of eminence, because sufficient prominence has not been given to what I believe to be the pathognomonic symptom in malignant disease of these organs. That symptom is frequently recurring hæmaturia; the urine in the intervals of the early period of the disease exhibiting no indications of renal or vesical disorder. The hæmaturia at length becomes continuous, and the patient dies from exhaustion. Whatever adds to the accuracy of diagnosis strengthens the remedial powers of medicine, and brings the physician nearer to the object to which all the efforts of our art are directed, the palliation if not the cure of disease. How many trifling and worthless remedies are administered in total ignorance of the pathological conditions out of which the patient's symptoms spring. How effect on the other hand remedies become, when the etiology a disease is recognised, and the true cause of the sympto detected.

The only period during which the diagnosis of cancer of t kidney or bladder is beset with any difficulty, is the first mo or two of the origin of the symptoms; and the disease then c hardly be distinguished, except by its antecedents, from calcu of these organs. Hæmaturia is characteristic of both; but calculus of the kidney, the patient in the great majority cases has suffered marked symptoms of gravel, or perhaps gout. Whereas, in cancer, till the hæmaturia occurs, sign of any kind gives rise to any suspicion of renal disord If attention be paid to the following most commonly occurri symptoms, anterior to the attack of hæmaturia, the difficulty the diagnosis, even in the earliest period, will be considera lessened. In calculus of the kidney there are pain and achi in the loins; frequency of micturition; urine more or l loaded with red sand and urates; sympathetic sensatio extending to the crest of the ilium, pubis, and those parts of t external surface which are supplied by the external cru cutaneous nerve, are among the most frequent premonito symptoms.

These, however, are by no means constant, nor are they be recognised in every case; but there is one that is nev absent, and which troubles the patient long before hæmatu alarms him, and that is frequency of micturition. This may present for weeks or for months—not always with the sa intensity, but varying much with the effects of diet a regimen. In cancer of the kidney these premonitions are n present. Hæmaturia is the first premonitory symptom, a the appearance of blood in the urine is unaccompanied by a sympathetic irritation, except that while it continues there troublesome frequency to pass water; but this frequency micturition accompanies the hæmaturia, it does not pre-exis nor does it continue after the hæmaturia has for a time cease This hæmorrhagic state varies very much in the early stage cancer of the kidney, both as regards duration and amount. In those cases which have fallen under my observation, the amount at first has been moderate, and the duration for a few days. The hæmaturia slowly disappears, leaving the urine for some time charged with blood-corpuscles, as revealed by the microscope; and with a few membranous flocculi, which are small fibrinous coagula, with no special character to distinguish them from similar coagula found in the hæmorrhagic period of calculus of the kidney. At this period, except in the antecedent symptoms, there is nothing to mark the difference between the two disorders. The characteristic differences are to be found in the symptoms which mark the progress of each.

In calculous disease, the urine, after the period of hæmorrhage has subsided, becomes daily more and more loaded with exudation-corpuscles, often called mucous urine; this fluid, when set at rest, throws down a conspicuous flocculent cloud, which, when examined by the microscope, is seen to consist of cells having a compound nucleus—many possessing the well-known reniform or trefoiled nucleus—thus gradually assuming the character of the pus-cell. Slowly the urine becomes more and more turbid and milky, and settles into the characteristic cream-coloured or yellowish sediment, from the abundance of pus-cells now thrown off. But in cancer of the kidney no such change as this follows the hæmaturia: a period of rest occurs, the urine, to the unaided eye, appears free from blood, and to all appearances healthy; weeks or months may pass, and then again hæmorrhage occurs. It probably may now last longer, and be so profuse as to make a sensible impression on the aspect and condition of the patient. Again it subsides, again returns: and thus, after a period of varying duration, exhausted by the frequency and abundance of the hæmorrhage, and worn out by the rapacity of the devouring cancer, for it is seldom limited at the last stage to the kidneys themselves, the patient dies with most of the usual evidences of the cancerous diathesis. So that what had offered at the commencement some difficulty of diagnosis, as the disease progresses, sufficiently pronounces itself, and declares with unmistakeable significance its incurable

and malignant character. It will be thus seen that t
diagnostic symptom of most value is the repetition of t
attacks of hæmaturia, the urine not becoming purulent, or w
any characteristic alteration during the intervals. The dise
with which cancer of the kidneys in its early stages is m
likely to be, and has been confounded, is polypus of t
bladder. This gives rise to frequent and serious attacks
hæmorrhage; but it also gives rise to symptoms of retention
urine from large coagula forming in the bladder, and blocki
up the entrance of the urethra. Such coagula rarely form
the hæmorrhage from calculus or cancer. The blood oozes
these disorders more slowly, and mixing with the urine, for
a solution of blood and urine with very small flocculent coagu
which are without difficulty passed through the urethra. B
in polypus the sudden gush of blood into the bladder coagula
in mass, and often forms an obstacle to the escape of the fl
part as well as the urine, which gives rise to the sympto
peculiar to retention of urine. The surgeon may succeed
detecting the presence of polypus when it has acquired a co
siderable size; but in the early stage of the disorder, ve
little reliance can be placed on catheter exploration.
malignant disease of the kidney, the presence or absence
sedimentary matter in the urine subsequent to the hæmorrha
will be dependent on the form of cancerous deposit. T
ulcerative process, in my experience, is very rare in these for
of disease. The scirrhous growth invades the organ, induc
attack after attack of hæmaturia, but rarely sets up an ulcer
tive process in the kidney; so that the urine does not furni
any sedimentary matter that is peculiar to these maligna
forms of disease. After death, the scirrhous mass, when limit
to the kidney, is seen deposited in considerable masses, obliter
ting and compressing the tubular structure, but not acco
panied by any ulceration. The diagnostic symptoms, then,
cancer of the kidney, on which most reliance can be placed
the repeated hæmaturia; the urine in the intervals presenti
nothing remarkable, becoming clear but natural in appearanc
and rarely having cells peculiar to this class of disorder. The

are no reliable sympathetic sensations, such as become so diagnostic in calculous disease of the kidney. The patient rarely complains of any uneasiness referable to the kidneys; but he experiences an aching at the pubis and glans penis, and some uneasy sensations, attributed to the stomach or some undefined spot in the abdominal cavity. These become, as the disease advances, more urgent, constant, and of that gnawing character which is peculiar to cancerous growth. But this is by no means universally the case. In some cases of long duration, and when the kidney becomes the seat of extensive cancerous deposit, a tumour may be traced in the lumbar spaces, and recognised as an enlarged kidney. But there is no symptom more constant than the frequent recurrence of hæmaturia. Indeed, towards the latter stages of the complaint the hæmaturia becomes habitual; and the patient dies, apparently more from the loss of blood than from the corroding and devouring voracity of the cancerous deposit.

Case L.—A clergyman, nearly sixty years of age, having enjoyed, up to the last two years, fair average health, consulted me for hæmaturia, which had been present, with intervals of only a few days, for two years. His aspect was that of one who enjoyed good health, and by no means indicated the serious hæmorrhage from which he had suffered so long. He stated that when travelling on the Continent about two years previously, he experienced some uneasy sensations in the abdomen, which were attributed to indigestion; and an uneasy sensation at the extremity of the penis which was followed by a considerable discharge of bloody urine. This continued for many weeks without any amelioration; and from that time to the present the longest interval he had known without blood in the urine had been three weeks. During these intervals the urine became, according to his observations, perfectly natural and clear. The pain, accompanied by a sense of heat in the urethral passage, then returned, and was accompanied by bloody urine. But he had never experienced any other symptoms calculated to throw light on the source or cause of this hæmaturia. He had never had gout, nor suffered from gravel, nor increased frequency of micturition; nor had he ever experienced a lumbar pain, or sense of aching or numbness in any pa supplied by sentient nerves, derived from the lumbar plexus.

He passed water in my presence, and it was bloody to a co siderable degree. Examined by the microscope the field w full of blood-discs, and amorphous fibrinous flakes; and sample examined several hours afterwards presented crystals uric acid. This urine, so bloody, nevertheless contained t natural proportion of urea and uric acid. The phosphates we not estimated. He had been taking gallic acid for some tim and he thought with some benefit, as it was under this trea ment that he experienced the longest interval from bloo urine. As I was very desirous of examining some of the uri free from blood, he was directed to continue the astringent un this desirable result was again obtained. Four days after, th event happened, and the urine was carefully examined, bo microscopically and chemically. By the first method, after th urine had been allowed to settle, a blood-disc here and ther with a few so-called exudation (mucous) corpuscles, and a c or two of vesical and urethral epithelium, were the only objec visible; and thus far, with the exception of the blood-discs, th urine was natural. Chemically, a trace of albumen was detecte the specific gravity was 1·018. There was a well-marked ac reaction; and urea and uric acid were in natural proportion The earthy phosphates were thought to be something in exces as estimated by precipitation by ammonia. This gentleman ha never suffered any symptoms of dropsy, no œdema of ankle nor any apparent diminution in the amount of urine voided. I was quite evident that neither morbus Brightii nor calculou disease of the kidneys were present, or could be assigne as the probable causes of the hæmaturia. Polypus of th bladder, and cancerous deposit in the kidneys, were the re maining possible diseases. Tubercle of the kidneys was ex cluded, because in that form of disease, although hæmaturi may occur in the outset, yet it is, within a very short time invariably followed by purulent urine; but in this case, fo more than two years, the urine had never been charged with an other ingredient but blood. It was, then, either a case of polypus of the bladder, or cancer of one or both kidneys. I understood that he had been examined by a distinguished surgeon, who pronounced the bladder free from disease. Up to this period the patient had been free from that symptom which I am inclined to think very characteristic of polypus of the bladder, which is, in addition to the copious hæmaturia, the co-existence, or rather formation of large coagula in the bladder, which block up the meatus urinarius, and give rise to great distress by the sudden stoppage of the current, and the painful efforts made by the patient to overcome the obstacle to the emptying the bladder. In cancer the hæmorrhage is usually slow, and the amount of blood, however great it may be in the twenty-four hours, is gradually passed into the bladder, and coagulation is continuously effected, as the blood drains from the kidneys; large coagula are therefore rare. But in polypus the gush of blood is frequently sudden and abrupt, and coagulation taking place quickly in the discharged blood, large coagula are produced, which offer serious impediments to the escape of the contents of the bladder; symptoms of retention are induced, the patient suffers much, and after much straining the clot which plugs the urethra may be suddenly and violently ejected. However, the last time I saw this patient, two months after the apparently favorable state of the urinary secretions already described, there had been a return of hæmaturia, which had continued uninterrupted by any interval for the space of three weeks. And now the hæmorrhage had become so profuse that the urine contained large coagula, which, obstructing the flow of urine through the urethra, caused much distress, till a violent forcing effort established the freedom of the passage. The sesquichloride of iron was ordered, and, in the event of the hæmaturia continuing, a surgical consultation was proposed. This gentleman returned to his house in the country. The hæmaturia continued; he became more and more exhausted. The escape of blood with the urine ceased, but he had become pallid and exhausted, and there appeared that peculiar lemon tinge so often seen in hæmorrhage from malignant disease. He

lived a few weeks, and died it was thought from the effects
the preceding hæmorrhage. In both kidneys were small no
lated masses, surrounded by dark black-stained conden
tissues. These deposits exceeded a pigeon's egg in size, and
with a cartilaginous hardness; one was, however, softer,
appeared breaking down. This deposit had reached the surf
of one of the cones, and appeared to be the seat of the l
attack of hæmorrhage. This case, I think, fully establishes
correctness of the observation, that frequently recurring hæn
turia, without any sedimentary deposit in the urine in
interval, may be recognised as pathognomonic of malign
disease of the kidney.

I will further illustrate this position by the record of a c
which singularly enough commenced as calculous pyelitis, w
its hæmaturia and mucous and slightly purulent urine;
proof consisting in the passage of the minute calculus wh
had given rise to these symptoms, and which terminated in m
lignant disease of the kidneys and ureters, with its prof
hæmaturia, at first intermitting, but subsequently becom
continuous and fatal.

I did not see this gentleman after the commencement of
last phase of his disorder. I am indebted to my friend M
Clendon for an account of the symptoms of this latter peri
and of the post-mortem appearances. I hazarded the conjectu
when before his death I was told of the repeated and continuo
hæmaturia, that it would be found that malignant deposit h
taken place in the kidneys.

CASE LI.—C. L., a gentleman, sixty-eight years of ag
residing in one of the suburban districts, of active habits and
average healthy appearance, consulted me in 1859 for sympton
of renal disease, consisting chiefly in an irritable state of th
urinary organs, expressed by frequency of micturition, wi
lumbar pain of an aching, wearing character, with a gnawin
sensation at the crest of the ilium. He looked on these symp
toms as warning him of what might follow, as two yea
previously he suffered in a like way, and subsequent to a violen
attack of griping pain, with nausea and vomiting, he passed

minute lithic acid calculus. He consulted the late Dr. Bright, who, as his health improved, recommended horse exercise; this brought on an attack of hæmaturia, small in amount, and which ceased after two days, and was followed by a cloudy state of the urine, an attack of pain similar to the one already mentioned, and the passage of another calculus. This experience led him to think that the present symptoms were the precursors to the passage of another calculus. He was directed to take the citrate of potash, and twice a day a drachm of the compound tincture of camphor, with five grains of benzoic acid. The urine, which was passed in my presence, contained a large proportion of epithelium from the calyces of the kidney and the ureters, as well as many so-called mucous-corpuscles. Three hours after passing, crystals of uric acid, of the rhomboidal form, appeared in numbers. His fears, however, as to the passage of another calculus were not this time realised. He derived great benefit from the remedies ordered, and continued quite free from any unpleasant return of his old symptoms. In July, 1860, he consulted me again, in consequence of his having again passed a minute concretion without any apparent difficulty, and unaccompanied by any of those distressing conditions of renal colic from which he had previously so acutely suffered. The concretion was examined; it was the size of a small pea, and was composed of pure uric acid. The only symptom of any moment, which, before this last occurrence, as well as at present, annoyed him, was frequency of micturition. The urine which was at this time examined, in addition to the microscopic objects which were present on the former occasion, contained a much larger proportion of mucous-corpuscles, and many of them assuming the reniform and trefoiled nucleus characteristic of the pus-cell. Chemically the urine contained nearly twice the amount of uric acid which constitutes the average of health. This gentleman continued to enjoy fair average health for some months, and was induced in the autumn of the year 1860 to make a tour in Spain. He was, while on his journey, seized with hæmaturia, so severe, and with such urgent symptoms of distress, that he was compelled to return home. The hæmaturia

continued, and was eventually succeeded by total suppression
urine, and death. The examination of the body after de
discovered the prostate gland, the seat of scirrhous grow
which extended backward and upwards into the ureters, co
pletely obliterating these canals.

I am indebted to my friend Mr. Clendon for these particula
as I did not see the patient again after his visit to me in t
spring of 1860.*

This case is corroborative of the diagnostic value of t
symptom of continuous hæmaturia in malignant diseases of t
urinary organs. I should, notwithstanding the antecede
history of renal calculus and pyelitis, have had no hesitation
this case of pronouncing the cause of the hæmaturia to ha
been malignant, or cancerous deposit somewhere in the kidne
ureters, or bladder. The case is valuable, because, havi
occurred in one who had previously suffered from hæmatu
from a different cause, which was followed by the usual chang
in the character and quality of the urine, and eventually by t
escape of the calculus, we are able to estimate the differen
between a temporary hæmaturia followed by mucous a
purulent urine, and subsequent return of the urine nearly
the standard of health, and a continuous hæmaturia followed
suppression of urine and death. No reliance can be placed
pain as a symptom of malignant disease of the kidneys
ureters. Far more suffering is experienced in renal calcul
and during the escape of the calculus down the ureter, than
experienced in malignant disease of the kidneys or bladde
The pain is more frequently caused by the obstruction to th
escape of the urine from the bladder by clots of blood, *i. e.*,
the ischuria, than by the cancerous deposit itself.

Hæmaturia continuing for days or weeks, the urine presentin
the ordinary characters in the intermissions, being free fro
granule-cells or pus-cells, and returning again and again wi
fatal exhaustion to the patient, may be accepted as the diagno

---

* Mr. Burton, of Blackheath, has communicated the facts of this case to t
South-Eastern branch of the British Medical Association, and which were pu
lished in the British Medical Journal, December 29th, 1860.

tic symptom of malignant or cancerous disease of the kidneys, ureters, or bladder.

I cannot forbear adding the details of another case very recently under observation, because it so clearly demonstrates the diagnostic value of persistent hæmaturia in malignant disease of the kidneys or bladder.

Case LII.—Jeremiah C—, æt. 59, by occupation a smith, was admitted in October, 1860, suffering from frequency of micturition, amounting almost to incontinence of urine, accompanied by a scalding pungent pain darting through the urethra, with a stabbing sensation in the region of the left kidney. His statement was, that about five weeks since, stooping suddenly, he felt a crick in the left side, which prevented his standing upright for a few minutes.

For a day or two he experienced great pain in the left lumbar region, which was followed by a copious discharge of blood with the urine. There was no indication of constitutional disturbance; the pulse was 76; urine was clear and free from blood, copious; and sp. gr. 1·018. He was ordered liquor potassæ. The urine was free from albumen, and when set aside threw down a faint and flocculent sediment, which was found to consist of the various forms of epithelium, with a few mucous- or exudation-corpuscles.

In a few days the frequency of micturition had abated, and was reduced to not more than thrice in the night. He however continued to suffer much pain in the lumbar region of the left side. A careful examination of the abdomen on several occasions failed to detect any tumour, or by pressure to induce any increase of suffering.

He was ordered warm baths daily, from which he experienced much relief. He also took the paregoric and benzoic acid, with apparent advantage, for his case was supposed at this time to present simply the features of renal irritation, caused by uric acid in excess, or probably the presence of a calculus in the left kidney. I watched with interest the changes in the character of the urine, which would more clearly afford a diagnosis of this disorder. But none such presented themselves; the urine daily

became more free from even a faint sediment; and in a mon
from admission he left the hospital, the urine being then qui
natural, and all the distressing symptoms of pain and frequen
of micturition having disappeared.

On the 26th of July, 1861, he again applied for admissio
suffering from severe paroxysms of pain at the pubis and t
extremity of the penis, temporarily relieved by micturitio
For more than a fortnight he had suffered from uninterrupt
hæmaturia. No renal tumour, nor any symptoms referable
the kidneys, could be made out. The countenance w
anxious, expressive of continuous suffering; but the pulse w
natural, and the digestive organs not disordered. An anody
plan of treatment was adopted; he took the liquor o
sedativus in moderate doses, with castor oil occasionally
counteract any constipating effect; and in the course of a f
days some relief to the intensity of his sufferings was obtain
The hæmaturia however continued. The bladder quickly fill
and the catheter was employed to empty the over-distend
viscus.

The mixture of blood and urine was most offensive and high
ammoniacal. I felt convinced that no renal disorder exist
here, or if so, that it was of a malignant character. I request
Mr. Holt to examine the bladder, and he failed to detect a
cause for this continuous hæmorrhage. The aspect of t
patient did not partake of the cancerous diathesis; but I f
sure that his symptoms arose either from polypus in the bladd
or some malignant development, giving rise to this uninterru
ted discharge of blood. Each day the catheter drew off fro
the over-filled bladder the same fœtid, ammoniacal mixture
blood and urine. Astringents were tried unavailingly. Opiu
dulled the sensibilities; but day by day exhaustion becan
more apparent, and without any material variation of the sym
toms, he died on the 15th of August, 1861. A post-morte
examination proved that the source of this hæmorrhage and t
death of the patient were caused by a soft spongy vascul
tumour, in the bottom of the bladder on the left side, and
little inferiorly to the entrance of the left ureter. It exhibit

all the characters of fungus hæmatodes. The coats of the bladder were thickened, and the lining mucous surface was coated with phosphatic deposit, caused by the rapid formation of the triple phosphate in an ammoniacal urine. The lumbar glands on each side of the bladder were adherent in mass, and seemed to be invaded with cancerous matter. This case, I think, fully establishes the correctness of the inference that continuous or intermitting hæmorrhage from the bladder or kidneys, the urine in the intermissions becoming neither mucous nor purulent, may be accepted as a reliable sign of malignant disease of the kidneys or bladder.

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